

BEFORE THE COUNCIL FOR THE CITY OF NEW ORLEANS

**APPLICATION OF ENTERGY NEW)
ORLEANS, INC. FOR APPROVAL TO)
CONSTRUCT NEW ORLEANS POWER)
STATION AND REQUEST FOR)
COST RECOVERY AND TIMELY RELIEF)**

DOCKET NO. UD-16-02

PRE-FILED SUPPLEMENTAL TESTIMONY

OF

DR. GEORGE THURSTON, SC.D

ON BEHALF OF

ALLIANCE FOR AFFORDABLE ENERGY,

DEEP SOUTH FOR ENVIRONMENTAL JUSTICE, 350 LOUISIANA – NEW ORLEANS

AND SIERRA CLUB

October 13, 2017

1 **Q1. PLEASE STATE YOUR NAME.**

2 A. I am George D. Thurston, Sc.D.

3 **Q2. HAVE YOU PREVIOUSLY TESTIFIED IN THIS PROCEEDING?**

4 A. Yes. I submitted pre-filed Direct Testimony in this proceeding on behalf of the Alliance
5 for Affordable Energy, the Deep South Center for Environmental Justice, and Sierra Club on
6 January 6, 2017.

7 **Q3. PLEASE PROVIDE A BRIEF SUMMARY OF YOUR JANUARY 6, 2017 DIRECT**
8 **TESTIMONY.**

9 A. Observational epidemiology studies provide the most compelling and consistent evidence
10 of the adverse effects of air pollution. These epidemiological investigations are of two types: 1)
11 population-based studies, in which an entire city's population might be considered in the
12 analysis; and 2) cohort studies, in which selected individuals, such as a group of asthmatics, are
13 considered. Both of these types of epidemiologic studies have shown confirmatory associations
14 between air pollution exposures and increasing numbers of adverse impacts, including:

- 15 • decreased lung function (a measure of our ability to breathe freely);
- 16 • more frequent asthma symptoms;
- 17 • increased numbers of asthma and heart attacks;
- 18 • more frequent emergency department visits;
- 19 • additional hospital admissions; and
- 20 • increased numbers of deaths.

21 The fact that the effects of air pollution have been shown so consistently for so many
22 health endpoints and in so many locales indicates these associations to be causal. Indeed, and I
23 concur, the most recent U.S. EPA Particulate Matter Integrated Science Assessment ("ISA")

1 unequivocally states that “[t]ogether, the collective evidence from epidemiologic, controlled
2 human exposure, and toxicological studies is sufficient to conclude that *a causal relationship*
3 *exists between short term exposures to PM_{2.5} and cardiovascular effects . . . and mortality.*”
4 (USEPA, 2009).

5 With respect to PM_{2.5} from power plants, my recent studies have found that long-term
6 exposure to combustion-related fine particulate air pollution is an important environmental risk
7 factor for cardiopulmonary and lung cancer mortality. In addition to the acute health effects
8 associated with daily PM pollution, long-term exposure to fine PM is also associated with
9 increased lifetime risk of death and has been estimated to take years from the life expectancy of
10 people living in the most polluted cities, relative to those living in cleaner cities. These health
11 impacts are particularly high for particulate matter from fossil-fuel-burning facilities, and
12 because natural-gas-fired sources emit a much greater percentage of the particles as ultrafine
13 particles, which have a much higher surface area per mass than larger particles, it is likely that
14 there is a much *greater* effect per pound of PM_{2.5} emitted by gas-fired sources than for PM_{2.5}
15 emitted by sources burning other fossil fuels. Older adults, those economically disadvantaged,
16 children, and those with pre-existing disease are at especially high risk.

17 Since outdoor particulate matter air pollution readily infiltrates into homes, nearby
18 residents will be exposed even when indoors. In addition, there is no evidence to date that there
19 is any threshold below which the adverse effects of air pollution will not occur. Just as cleaning
20 the air below the National Ambient Air Quality Standards (NAAQS) would avoid air pollution
21 related deaths, any increase in pollution will increase the risk of adverse effects at all levels of
22 prevailing air pollution, even when the NAAQS standards are not violated. Thus, I disagree with

1 the statement in the NOPS application Supplement that: “in no case, will the emissions cause air
2 quality to exceed regulatory standards, which are protective of human health.”

3 Regarding the proposed new facility, since the old Michoud Electric Generating Plant is
4 no longer in operation, the logical and relevant baseline would be zero emissions, not the
5 emissions of a now-decommissioned, and logically irrelevant, plant. The proposed new plant’s
6 startup/shutdown operations are an important factor in assessing the potential adverse health
7 impacts of the proposed power plant, and the extreme increases in Volatile Organic Compounds
8 and in carbon monoxide emissions predicted in Tables D-2B and D-2D (versus Normal
9 Operations emissions) are of concern, due to their frequent occurrence throughout the year
10 during the startups/shutdowns at this proposed plant.

11 Overall, additional emissions from the proposed facility will add to the existing levels of
12 PM_{2.5} in the vicinity of the plant. Because no threshold of air pollution effects, below which no
13 effects occur, has yet been found to exist, any incremental PM_{2.5} exposures can be expected to
14 add an incremental adverse health risk to nearby residents from the proposed power plant’s
15 associated added air pollution.

16 **Q4. WHAT IS THE PURPOSE OF YOUR SUPPLEMENTAL TESTIMONY?**

17 A. I respond to the Supplemental and Amending Direct Testimony of Dr. Bliss M. Higgins
18 filed on behalf of Entergy New Orleans, Inc.

19 **Q5. IN HER TESTIMONY, DR. HIGGINS STATES THAT: “DR. THURSTON’S**
20 **OPINION, WHICH AMOUNTS TO AN ASSERTION THAT ONLY ZERO EMISSIONS**
21 **COULD BE CONSIDERED PROTECTIVE OF PUBLIC HEALTH, REPRESENTS THE**
22 **VIEW OF A SINGLE SCIENTIST.” IS THIS A CORRECT CHARACTERIZATION OF**
23 **YOUR TESTIMONY?**

1 A. No, that is a misrepresentation of my testimony. Unlike Dr. Higgins, most independent
2 scientists like myself have reached a consensus that there is no convincing evidence that a
3 threshold exists for air pollution, below which there is no effect of air pollution. Also, in this
4 case, we are not considering a zero pollution situation, but a place where pollution already exists,
5 and Entergy New Orleans is now proposing to add to that extant pollution. So, the question of
6 possible effects all the way down to zero concentrations is a “red herring”, and is quite irrelevant
7 to the real world situation at hand in this case, where the prevailing pollution to which the
8 proposed power plant will be added are well above the zero concentration situation to which Dr.
9 Higgins opines.

10 **Q6. IS YOUR PREVIOUS TESTIMONY CONSISTENT WITH THE BROAD**
11 **CONSENSUS OF SCIENTIFIC OPINIONS REGARDING THE LACK OF A KNOWN**
12 **THRESHOLD OF AIR POLLUTION EFFECTS?**

13 A. Yes. Despite Dr. Higgins assertion that my testimony “represents the view of a single
14 scientist”, my opinion is consistent with the broad consensus of opinions by past EPA scientific
15 panels, and by other independent scientists in my field, regarding the lack of a known threshold
16 of effects, below which there might be no effects of particulate matter air pollution. Indeed, the
17 scientific community has reached the consensus long ago that there is no convincing evidence of
18 a threshold of effect and the US EPA has repeatedly recognized this fact in the past. This is
19 demonstrated in my original testimony (see Figure 7 and the discussion regarding it in my
20 Declaration). Moreover, in the Review of the EPA’s Draft Health Benefits of the Second Section
21 812 Prospective Study of the Clean Air Act¹, it is stated on page 2 that “the HES fully supports
22 EPA’s use of a no-threshold model to estimate the mortality reductions associated with reduced

¹[https://yosemite.epa.gov/sab/sabproduct.nsf/0/72D4EFA39E48CDB28525774500738776/\\$File/EPA-COUNCIL-10-001-unsigned.pdf](https://yosemite.epa.gov/sab/sabproduct.nsf/0/72D4EFA39E48CDB28525774500738776/$File/EPA-COUNCIL-10-001-unsigned.pdf)

1 PM exposure.”, and on page 6 “The HES also supports the Agency’s choice of a no-threshold
2 model for PM-related effects.” Similarly, in the American Heart Association scientific statement
3 on air pollution health effects (Brook et al., 2010), it is clearly stated (on pages 2350-2351), in
4 agreement with my testimony, that “There also appears to be a monotonic (e.g., linear or log-
5 linear) concentration-response relationship between PM_{2.5} and mortality risk observed in cohort
6 studies that extends below present-day regulations of 15 µg/m³ for mean annual levels, without a
7 discernable ‘safe’ threshold.”

8 A more recent documentation of the fact that there is a scientific consensus that air
9 pollution effects occur even at levels below the prevailing NAAQS is the recent article from
10 Fann et al (2017) which states very clearly: “The risk coefficient assumes a log-linear
11 relationship between PM_{2.5} and mortality over all possible values of PM_{2.5}, such that there is no
12 threshold concentration below which PM_{2.5}-attributable mortality falls to zero. This assumption
13 is consistent with findings in previous studies, which reported no evidence of a population-level
14 threshold in the relationship between long-term exposure to PM_{2.5} and mortality, and so we
15 elected not to apply one in this health impact function (Crouse et al. 2012; Schwartz et al. 2008;
16 U.S. EPA 2009).”

17 In addition, a very recent nationwide analysis of mortality in a cohort of all Medicare
18 beneficiaries in the continental United States (60,925,443 persons), published in the New
19 England Journal of Medicine, found that “In the entire Medicare population, there was
20 significant evidence of adverse effects related to exposure to PM_{2.5} and ozone at concentrations
21 below current national standards.” (Di Q et al, 2017).

22 Similarly, Perlmutter et al (2017) found in their research on the effects of air pollution on
23 New York City hospital admissions that “The majority of excess hospital admissions (i.e., > 90%

1 in Bronx County) occurred when the AQI was <100 ('good' or 'moderate' level of health
2 concern) regardless of whether PM_{2.5} was the driver pollutant." Since when the air quality is
3 below 100, it is within the air quality standards, this work is consistent with my testimony, and
4 with the general scientific consensus that air pollution levels below the National Ambient Air
5 Quality Standards (NAAQS) do have significant adverse health impacts.

6 **Q7. IS DR HIGGIN'S TESTIMONY CONSISTENT WITH THE REPORTS DISCUSSED**
7 **ABOVE?**

8 A. No. In contrast to the facts and opinions discussed above, Dr. Higgins argues that the
9 NAAQS provide "a set of standards requisite to protect public health, including sensitive
10 populations, with an adequate margin of safety margin of safety". While that was the stated goal
11 of the Clean Air Act when enacted by Congress in the early 1970's, Dr. Higgins is ignoring the
12 fact that this presumption by the Congress has since been found to not square with scientific
13 facts, as discussed above. To argue that such a no-effect threshold exists at the ambient standard
14 limits, as Dr. Higgins effectively does, is as specious as saying that passengers in an automobile
15 are at absolutely no risk of being hurt in a car accident when they are traveling below the legal
16 speed limit. Thus, it is Dr. Higgins who is providing a minority, unsupportable view, in conflict
17 with the documented scientific evidence and consensus on the question of air pollution effects at
18 concentrations at and below the ambient air quality standards. The scientific evidence and
19 consensus instead reveal that air pollution exposure increments in the vicinity of the proposed
20 Entergy plant will have adverse human health effects on the public, irrespective as to whether
21 they occur above or below the prevailing NAAQS.

22 It is important to also note that one should not, as Dr. Higgins implies, include the prior
23 Michoud units as part of the baseline for the new plant from the perspective of public health, as

1 assuring public health from a public-trust/prudence perspective is the goal here, not some
2 technical meeting of a Prevention of Significant Deterioration (PSD) or a NAAQS. Thus, just
3 because the community was exposed to *more* pollution in the past, doesn't make new NOPS
4 emissions more acceptable in any way. Indeed, if approved and operated, this new plant will just
5 add to the local community's already accrued air pollution exposures visited upon them by the
6 prior plant.

7 **Q8. IS DR. HIGGINS CHARACTERIZATION OF YOUR TESTIMONY AS PREMISED**
8 **ON THE FACT THAT THE EMISSIONS FROM THE SHUTDOWN OF THE MICHLOUD**
9 **UNITS SHOULD BE IGNORED CORRECT?**

10 **A.** No. In her testimony, Dr. Higgins states that "Dr. Thurston is incorrect in his premise that
11 the emissions from the shutdown Michoud units should be ignored, and his testimony is
12 unreasonable if he means to suggest that the shutdowns should have been delayed to occur after
13 the startup of the new 2 NOPS unit(s)." However, I have not said anything regarding a delay of a
14 shutdown of the old power plant. In addition, I am not ignoring the old power plant, it is just
15 that, whether or not the old plant shut down, it is irrelevant to the consideration of this newly
16 proposed plant and its associated human health consequences, which is the actual subject of my
17 testimony.

18 **Q9. IS DR. HIGGINS CORRECT THAT IT IS NOT PRACTICAL FOR INDIVIDUAL**
19 **PERMIT APPLICANTS TO PERFORM A DETAILED HEALTH RISK ANALYSIS.**

20 **A.** No. Dr. Higgins claims that it is not "practical for individual permit applicants to perform
21 a detailed health-risk analysis of the type described by Dr. Thurston as part of the permitting
22 process for every change." However, the EPA provides a routinely available BenMAP model
23 that is very appropriate, and has previously been applied, to analyses of individual or groups of

1 air pollution sources to estimate their impacts, as I suggest. All that is required is for the
2 applicant to hire a consultant to conduct an air dispersion analysis of the emissions proposed and
3 to then enter the estimated downwind adverse air quality impacts into the free and publically
4 available BenMAP model to derive estimates of the expected human health impacts and their
5 monetary valuations (Abt Associates, 2010).

6 **Q10. DO YOU HAVE ANY CHANGES TO THE CONCLUSIONS YOU REACHED IN**
7 **YOUR DIRECT TESTIMONY?**

8 A. No. I reaffirm my prior testimony's conclusions, as applied to both the CT and RICE
9 units. Additional emissions from the proposed facility will add to the existing levels of PM_{2.5} in
10 the vicinity of the plant, and, because no threshold of air pollution effects has yet been found,
11 any incremental PM_{2.5} exposures add an incremental adverse health risk to nearby residents from
12 power plant air pollution. Thus, any action that increases the ambient concentration of PM_{2.5} in
13 this area will have an adverse impact on human health in the exposed population. These
14 incremental health effects risks would in no way be mitigated or negated by other respiratory
15 health effects risks, such as indoor air pollution exposures, which would represent independent
16 health risks of their own. I therefore conclude that, to the extent that the proposed facility will
17 emit additional levels of PM_{2.5}, it will cause an increase in the risk of adverse health effects
18 among those who breathe that pollution, and especially for those who live within the most
19 affected areas immediately surrounding the plant.

20 **Q11. DOES THIS CONCLUDE YOUR TESTIMONY?**

21 A. Yes.

LITERATURE CITED

Abt Associates (2010). BenMAP Environmental Benefits Mapping and Analysis Program User's Manual. Prepared for the U.S. EPA Office of Air Quality Planning and Standards, RTP, NC.

Brook RD, Rajagopalan S, Pope CA 3rd, Brook JR, Bhatnagar A, Diez-Roux AV, Holguin F, Hong Y, Luepker RV, Mittleman MA, Peters A, Siscovick D, Smith SC Jr, Whitsel L, Kaufman JD (2010). "Particulate matter air pollution and cardiovascular disease: an update to the scientific statement from the American Heart Association." *Circulation*. 121:2331-2378.

Crouse DL, Peters PA, van Donkelaar A, Goldberg MS, Villeneuve PJ, Brion O, Khan S, Atari DO, Jerrett M, Pope CA, Brauer M, Brook JR, Martin RV, Stieb D, Burnett RT. (2012) Risk of nonaccidental and cardiovascular mortality in relation to long-term exposure to low concentrations of fine particulate matter: a Canadian national-level cohort study. *Environ Health Perspect*. 2012 May; 120(5):708-14.

Di Q, Wang Y, Zanobetti A, Wang Y, Koutrakis P, Choirat C, Dominici F, Schwartz JD. Air Pollution and Mortality in the Medicare Population. *N Engl J Med*. 2017 Jun 29; 376(26):2513-2522.

Fann N, Kim SY, Olives C, Sheppard L. (2017) Estimated Changes in Life Expectancy and Adult Mortality Resulting from Declining PM_{2.5} Exposures in the Contiguous United States: 1980-2010. *Environ Health Perspect*. 2017 Sep 6; 125(9).

Perlmutter L, Stieb D, Cromar K. Accuracy of quantification of risk using a single-pollutant Air Quality Index. *J Expo Sci Environ Epidemiol*. 2017 Jan; 27(1):24-32.

Schwartz J, Coull B, Laden F, Ryan L. 2008. The effect of dose and timing of dose on the association between airborne particles and survival. *Environ Health Perspect* 116(1):64-69.

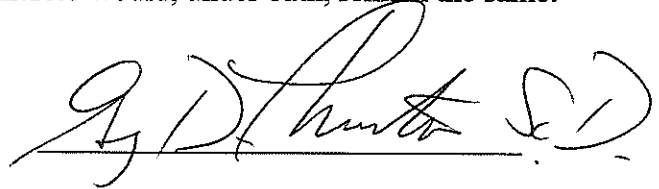
U.S. Environmental Protection Agency (US EPA) (2009): Integrated Science Assessment for Particulate Matter (Final Report), Washington, DC, EPA/600/R-08/139F, at 2-10, 2-11 (emphasis in original), available at: <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546>.

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STATE OF New Jersey)
DISTRICT OF Bergen)

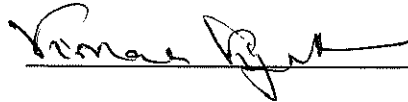
I, George D. Thurston, do hereby swear under the penalty of perjury the following:

That I am the person identified in the attached prepared testimony and that such testimony was prepared by me under my direct supervision; that the answers and information set forth therein are true and accurate to the best of my personal knowledge and belief; and that if asked the questions set forth herein, my answers thereto would, under oath, remain the same.



George D. Thurston, Sc.D.

SWORN TO AND SUBSCRIBED BEFORE ME THIS 13TH DAY OF OCTOBER, 2017



NOTARY PUBLIC

My commission expires: _____

