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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

'83 JUN -6 A11:36

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

HOUSTON LIGHTING AND POWER COMPANY, ET AL.	)	Docket Nos. 50-498 OL 50-499 OL
(South Texas Project, Units 1 and 2)	)	

CITIZENS CONCERNED ABOUT NUCLEAR POWER (CCANP)
RESPONSE TO APPLICANTS' MOTION TO COMPEL ANSWERS TO
ITS [SIC] SEVENTH SET OF INTERROGATORIES AND REQUESTS
FOR PRODUCTION OF DOCUMENTS TO CCANP

I. INTRODUCTION

On March 28, 1983, Applicants served CCANP with their seventh set of interrogatories.

On April 20, 1983, CCANP filed a motion requesting extension of various deadlines, including response time on the Applicants' seventh set of interrogatories.

On May 11, 1983, the ASLB extended the time for CCANP to respond to the Applicants' motion to compel answers to their seventh set of interrogatories.

CCANP herein files its answers to the Applicants' seventh set of interrogatories.

Were a disinterested human told that someone had a plan to put the most dangerous machine ever invented by humans in the path of the most powerful storm system ever created by God, the disinterested human might well find such an idea foolish and even unbelievable.

But in this proceeding, the Board is being asked to consider whether the South Texas Nuclear Project is adequately designed

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to withstand a hurricane. This inquiry is necessary because Houston Lighting and Power decided that STNP should be located in an area frequently struck by hurricanes.

CCANP's position is that the inquiry itself is basically meaningless. "Due to its size, intensity, and duration, the hurricane is the most destructive weather phenomenon known to man."[1] This phenomenon is not well understood, data is available only for a relatively short historical period (1871 to present), and measurements have come from a limited number of installations. "In one respect, hurricanes are like snowflakes - no two are exactly alike."[2] Furthermore, "hurricane forecasting involves extensive monitoring and complex modelling of a natural phenomenon which displays significant random behavior."[3] Given the power, unique nature, and unpredictability of hurricanes, the existing data base is too limited to permit prediction of future hurricane behavior or characteristics with any degree of certainty. See e.g. Attachment 1.

The conservative approach to hurricane design would be to assume any probable limiting measurement is correct (even if estimated) and add some percentage increase to that measurement as a margin of safety. For example, if the estimated highest gust of wind to date is 180 m.p.h., a conservative approach might well be to assume the possibility of a 20% faster gust in some future storm (or the possibility that a 20% faster gust went unrecorded in a past storm).

Remarkably, the Applicants have chosen precisely the opposite course of action - eliminating estimated and even recorded wind speeds on technical grounds. The Applicants also

appear to have ignored or avoided available data in selecting the design wind velocities. Since the data comes from the most likely places to seek hurricane information,[4] the failure of the Applicants to use this data raises a larger question of Applicants' commitment to a truly safe design for STNP. The question goes ultimately to Applicants' character as the failure to incorporate official data demonstrates a careless disregard for the truth.

Hurricanes are destructive in various ways. First of all, within a hurricane system the "condensation heat energy release by a hurricane in one day can be the equivalent of energy released by fusion of four hundred 20-megaton hydrogen bombs."[5]

This energy release produces high winds, storm surge, tornadoes, and heavy rains. Each of these elements of a hurricane can produce devastating effects.

"In most hurricanes, these winds [inner band forming the wall of the eye] exceed 90 knots (50 meters per second) [135 m.p.h.] - nearly twice that in extreme cases [twice being 270 m.p.h.]."[6] Winds in this range can be very destructive.

In designing buildings to withstand these winds, the selection of a particular wind speed can make a tremendous difference in the forces the design must withstand and, therefore, in the cost of the construction. The wind force applied to any object increases with the square of the wind speed.[7] A 100 m.p.h. wind exerts a force of approximately 40 pounds per square foot. A 160 m.p.h. wind exerts a force of approximately 100 pounds per square foot. A 200 m.p.h. wind

exerts a force of approximately 160 pounds per square foot. When rain is driven by the wind, the force is even greater.[8]

As the hurricane moves toward land, the action of the high winds raises the mean water level. A storm surge is formed which is usually the most destructive element of a hurricane. A storm surge can rise 20 feet or more above normal water levels.[9] The storm surge comes across the coastline "near the area where the eye of the hurricane makes landfall" and "acts like a giant bulldozer sweeping everything in its path."[10]

Adding to the destructive force of the storm surge, wind waves 5 to 10 feet high are "superimposed on the storm tide."[11]

To truly appreciate the destructive potential of a storm surge, it is useful to consider the force of the surge. Water weighs 1700 pounds per cubic yard (1000 kilograms per cubic meter)[12] or 67 pounds per cubic foot.[13] In Hurricane Camille, the storm surge at Gulfport, Mississippi was calculated to be 2 miles wide, 12 feet deep, and 1 mile long (out to sea), essentially "a battering ram weighing more than 20 million tons."[14]

Adding still further to the destructive effect of the storm surge is the return of the water to the sea with all of the debris accumulated in the surge.

Besides high winds and storm surge, hurricanes also produce tornadoes. These tornadoes tend to be smaller in width and travel a shorter distance on the ground than non-hurricane generated tornadoes. But there can be dozens of them generated by one hurricane; Beulah spawned 115 in Texas alone. Given their short duration and their unpredictable appearance in the midst of a hurricane, studying these tornadoes is a very difficult task. In

fact. "[n]o measurements of the wind speed in tornadoes associated with hurricanes are known."[15]

Finally, hurricane rainfall can produce very heavy flooding. Typically, a hurricane brings 6 to 12 inches of rain to the area it passes over.[16] Low lying areas are flooded, rivers overflow, evacuation routes are cut off, and massive damage often results.

The hurricane is all of these elements at the same time. The cumulative and synergistic effects of high winds, storm surge, tornadoes, and flooding can be a disaster on the scale of a war. In the aftermath, there can be a serious public health problem caused by polluted water supplies, dead livestock, snakes driven from their lairs, and damaged utilities - all adding to the storm caused crisis.

The South Texas Nuclear Project is located in Matagorda County near the Texas coast. As of 1976, Matagorda County had been the landfall point for hurricanes entering Texas on six different occasions - 1921, 1941, 1942, 1945, 1949, and 1961.[17]

In fact, based on an analysis of past storms, Matagorda County is the most likely place in Texas for hurricanes to make landfall and for extreme hurricanes (winds in excess of 136 m.p.h.) to make landfall.[18] Matagorda County is, therefore, the one spot in Texas most likely to experience 200 m.p.h. winds in the wall of the eye, the highest storm surge, the most tornadoes, and the greatest flooding. What a marvelous place to put a nuclear power plant! Only hubris or gross incompetence can adequately explain the siting decision.

As to the Applicants' interrogatories, CCANP will answer

them having registered its opinion that the inquiry posed for the Board is meaningless.' By giving answers, CCANP in no way wishes to contribute to the foolish notion that this location is possibly a safe place to put a nuclear power plant.

The Applicants include various requests for documents. Since many of the CCANP documents came from CEU and since the Applicants have conducted prior discovery on this contention from CEU, CCANP assumes Applicants already have most of the documents CCANP relies upon. All documents listed in the footnotes herein are available for inspection and copying at 2007 D Nueces, Austin, Texas or, if Applicants so desire, CCANP will respond to requests for copying of particular documents.

II. ANSWERS TO INTERROGATORIES

1. Section 3.3.1.1 of the STP FSAR states that

> As required by Reg. Guide 1.70, a design wind velocity based on the fastest mile wind speed, 30 ft above ground, 100-year mean recurrence interval has been selected. The design wind velocity for STP is 125 mph at 30 ft. above ground level....

Does CCANP contend that for the South Texas Project site the fastest mile wind speed, 30 ft. above ground, 100-year mean recurrence interval is greater than 125 mph? If so, state the bases for such contention with every fact supporting such bases (including a statement of the wind speed CCANP contends to be the fastest mile wind speed, 30 ft. above ground, 100-year mean recurrence interval), identify and produce all studies or other documents upon which CCANP relies, and identify each expert witness that CCANP expects to testify on its behalf with respect to such contention.

CCANP contends that the information available on hurricanes generally assumes 200 m.p.h. winds or higher on the wall of the eye. Since Matagorda County is a favorite entrance for hurricanes into Texas, we can anticipate the possibility of a hurricane eye coming ashore at STNP and hesitating in one spot long enough for one mile of wind to pass by STNP at 200 m.p.h. at 30 ft. above

ground. Given that possibility and the need for great conservatism in designing a nuclear power plant which is going to put all of South Texas at risk, CCANP contends that Applicants should have used 200 m.p.h. as the fastest mile speed in their design.

CCANP further contends that the Applicants' design wind velocity reflects not only an avoidance of the generally assumed 200 m.p.h. winds but also reflects a careless disregard for the data available publicly on known wind speeds of past hurricanes entering the Gulf of Mexico.[20] In support of this contention, CCANP offers the following storm wind data (fastest one mile unless otherwise noted):[21]

1. 1947, Sept. 4-21	Hillsboro Light, Fla.	121 m.p.h. (one minute max. speed) 155 m.p.h. gust
2. 1949, Sept. 27-Oct. 6	Freeport, Tx.	135 m.p.h. (estimated)
3. CARLA 1961, Sept. 3-15	Port Lavaca and Matagorda, Tx.	145 m.p.h. (estimated)
	Port Lavaca	153 m.p.h. gust (measuring equipment disabled) 175 m.p.h. (estimated)
4. HILDA 1964, Sept. 28-Oct. 5	Franklin, La.	135 m.p.h. (estimated)
5. BETSY 1965, Aug. 27-Sept. 12	Port Sulphur, La.	136 m.p.h.
6. CAMILLE 1969, Aug. 14-22	Gulfport, Miss.	100 m.p.h. (estimated) 150-175 m.p.h. gusts[22] (190 m.p.h.)
7. CELIA 1970, July 24-Aug. 5	Corpus Christi, Tx.	130 m.p.h. 161 m.p.h. gusts (160-180 gusts)[23]

8. ANITA	Northern Coast of Mex.	186 m.p.h.[24]
9. 1982, Nov. 4	Freak wind at Port Isabel, Tx.; no prior warning	140-145 m.p.h.[25]

CCANP has no expert witness at this time.

2. Questions 2 through 6 all deal with whether STNP is adequately designed to withstand the effects of tornadoes. CCANP contends that the information on hurricane generated tornadoes is too limited to assess the reliability of Applicants design basis assumptions.[25] Applicants cannot, therefore, sustain their burden of proof in supporting the adequacy of their tornado related designs.

7. In addition to the information provided in response to interrogatories 1-6, supra., are there any other facts or reasons which CCANP contends support its contention that the South Texas Project is not adequately designed to provide reasonable protection to the public health and safety from the direct or indirect effects on safety related structures and equipment of hurricane winds or missile propelled by hurricane winds (Contention 4)? If so, identify all such facts and reasons, identify and produce all studies or other documentation upon which CCANP relies for such facts or reasons, and identify each expert witness that CCANP expects to testify on its behalf with respect to such contention.

"Hurricane surge is the most destructive element on the Texas Coast."[27] With a tide of 20 feet or more above mean sea level topped by waves 5 to 10 feet high, tremendous destructive force is brought to the land.

Hurricane Carla had a storm surge reaching 21 feet and extending as far as 10 miles inland.[28] Port Lavaca had tides 18.5 feet above normal.[29] Hurricane Camille had a storm tide 24.2 feet above sea level.[30]

Conceivably every building at STNP not 30 to 35 feet above the normal high tide level with be subject to battering from

storm surge created by the hurricane winds.

There is also the problem of the combined effect of more than one seriously adverse condition at the same time. A building being pounded by a ten foot wave and by rain laden winds of 200 m.p.h. is under far more stress than it would be from either of the stress sources alone.

8. CCANP does not intend to call any expert witnesses at this time.

9. n/a

10. All answers are by Lanny Alan Sinkin.

Respectfully submitted,

Lanny Alan Sinkin

Lanny Alan Sinkin
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Dated: May 31, 1983

FOOTNOTES

1. Henry, Driscoll, and McCormack, "Hurricanes on the Texas Coast," Texas A&M University, July 1975, TAMU-SG-75-504 at 3.

2. Id. at 8.

3. Texas Coastal Marine Council, "Pictorial Atlas of Texas Coastal Hazards," January 1977 at 18.

4. Primarily the U.S. Department of Commerce (NOAA).

5. "Hurricane: The Greatest Storm on Earth," U.S. Dept. of Commerce, NOAA/PA 76008 (1977) at 11.

6. Id. at 10. See also Branley and Kessler, "Hurricane Warning: A Booklet for Boys and Girls,' U.S. Dept. of Commerce, NOAA/PA 77001 at 6 (hurricane winds blow "as much as 200 miles (322 kilometers) an hour"); Henry, et al., supra, note 1 at 3.

7. Henry, et al., supra, note 1 at 18

8. Id.

9. "Hurricane ...", supra, note 5 at 11.

10. "Storm Surge and Hurricane Safety," U.S. Dept. of Commerce, NOAA/PA 78019

11. "Hurricane ...", supra, note 5 at 15.

12. Id.

13. "The Homeport Story," U.S. Dept. of Commerce, NOAA/PA 70028 (1971) at 3.

14. Id.

15. Harris, D. Lee, "The Prediction of Hurricane Storm Surges: A State-of-the-Art-Survey," Coastal and Oceanographic Engineering Laboratory, College of Engineering, University of Florida (1980) at 14.

16. "Hurricane ...", supra, note 5 at 15.

17. Morton, Pieper, and McGowen, "Shoreline Changes in Matagorda Peninsula (Brown Cedar Cut to Pass Cavallo): An Analysis of Historical Changes of the Texas Gulf Shoreline," Bureau of Economic Geology, University of Texas at Austin (1976) at 15.

18. Henry, et al. note 1 at 13. See also Appendix II, Table 1 (21 of 91 tropical storms or hurricanes making landfall in Texas came ashore near Indianola, Victoria, or Matagorda - all quite near STNP).

19. See note 6 supra. See also "The Homeport Story" supra, note 13 at 2.

20. Given the size of hurricanes and their unpredictability, CCANP assumes that the data from any hurricane entering the Gulf of Mexico should be considered in the STNP design. In fact, an argument could well be made that any North Atlantic hurricane data is relevant since the storms form in the same area and the storm moving into the Gulf or up the Atlantic sea board seems a matter of pure chance.

21. Unless otherwise footnoted, all wind speed data is from "Some Devastating North Atlantic Hurricanes of the 20th Century," U.S. Dept. of Commerce, NOAA/PA 77019 (Rev. 1977).

22. "The Homeport Story," supra, note 13 at 2.

23. Henry, et al., supra, note 1 at 16; Texas Coastal Marine Council, supra, note 3 at 6, 45.

24. Press Release, Texas Catastrophic Property Insurance Association (TCPIA), August-September 1978, No. 1 of 4.

25. San Antonio Express, November 4, 1982 at 1; Daily Texan, November 4, 1982 at 3.

26. See text accompanying note 15 supra..

27. Morton, et al., supra, note 17 at 23.

28. Henry, et al., supra, note 1 at 24.

29. Id. at 10.

30. "Some Devastating ..." supra, note 21.

STATE OF TEXAS (
)
COUNTY OF TRAVIS (

BEFORE ME, the undersigned authority, on this day personally appeared LANNY ALAN SINKIN, who upon his oath stated that he has answered the foregoing interrogatories in Applicants' Seventh Set of Interrogatories and Requests for Production of Documents to CCANP in his capacity as counsel for Citizens Concerned About Nuclear Power, Inc. and that all statements contained therein are true and correct to the best of his knowledge and belief.

Lanny Alan Sinkin
LANNY ALAN SINKIN

SUBSCRIBED AND SWORN TO BEFORE ME by the said LANNY ALAN SINKIN on this 2nd day of June 1983.

Nancy E. Lawler
Notary Public in and for
Travis County, Texas
NANCY E. LAWLER

My Commission expires:
1/20/86

ATTACHMENT 1

A8 Austin American-Statesman Monday, May 30, 1983

El Nino poses current threat

Warm-sea phenomenon could affect hurricane season

CORAL GABLES, Fla. (AP) — Warm Pacific Ocean winds that caused a drought in Australia and torrential rains in Peru may meddle next with the summer hurricanes in the Atlantic.

The hurricane season, responsible for fierce storms with winds that can reach 150 mph or more, officially starts Wednesday and continues through Nov. 30.

Forecasters at the National Hurricane Center say the big monster storms will be delayed until mid-August or September because of the return of what is known as El Nino, the occasional unusual warming of the sea.

The phenomenon adds unusual strength to the upper atmosphere jet stream and "blows the tops off" storms before they can become hurricanes, National Hurricane Center forecaster Gil Clark said.

THE DRAMATIC reduction in the southeastern trade winds that cause El Ninos happens every 10 to 15 years. El Nino, Spanish for child, is named for the Christ child because it usually comes in late December.

El Ninos surprised meteorologists by starting in September last year, bringing the most severe temperature fluctuations of the century, Clark said.

El Ninos have been blamed for droughts this year in Australia and Southeast Asia, the flooding that caused mudslides in Ecuador and Peru, less than normal monsoon rains in India and the heavy storms in California and across the southern United States.

Scientists are beginning to believe the periodic warm currents are linked to a huge shift in barometric pressure in the Southern Hemisphere known as the southern oscillation. The event usually lasts 12 to 18 months.

EL NINOS form when the surface winds over the ocean drop dramatically, allowing the water to warm rapidly. The heat from the ocean rises, adding strength to the jet stream. "The jet stream begins to increase and blows the top off these developing tropical storms," Clark said.

Ordinarily during hurricane season, the jet stream diminishes to almost nothing.

If the pattern holds, El Ninos will last a few more months and "by September, things will be back to normal," Clark said.

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CERTIFICATE OF SERVICE

I hereby certify that copies of CITIZENS CONCERNED ABOUT NUCLEAR POWER (CCANP) RESPONSE TO APPLICANTS' MOTION TO COMPEL ANSWERS TO ITS [SIC] SEVENTH SET OF INTERROGATORIES AND REQUESTS FOR PRODUCTION OF DOCUMENTS TO CCANP and of CITIZENS CONCERNED ABOUT NUCLEAR POWER (CCANP) SUPPLEMENT TO MARCH 18, 1983 MOTION FOR NEW CONTENTION were served by deposit in the United States Mail, first class postage paid or by Express Mail (*) to the following individuals and entities on the 2nd day of June 1983.

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