BEFORE THE FLORIDA
PUBLIC SERVICE COMMISSION

DOCKET NO. 060038-EI
FLORIDA POWER & LIGHT COMPANY

IN RE: FLORIDA POWER & LIGHT COMPANY'S PETITION FOR ISSUANCE OF A STORM RECOVERY FINANCING ORDER

APRIL 10, 2006

REBUTTAL TESTIMONY & EXHIBITS OF:

STEVEN P. HARRIS

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

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Q. Please state your name and business address.

A. My name is Steven P. Harris, my business address is 475 14th Street, Suite 550, Oakland, California 94612. This is a new business address as my office has relocated since my direct testimony was filed.

Q. Did you previously submit direct testimony in this proceeding?

A. Yes.

Q. What is the purpose of your rebuttal testimony?

A. I will respond to portions of the testimony submitted on behalf of the Florida Office of Public Counsel (OPC) and AARP by Stephen A. Stewart, which address the level of the Storm Damage Reserve to be approved in this proceeding.

Q. Are you sponsoring any exhibits?

A. Yes. I am sponsoring an Exhibit, which is comprised of the following documents that are attached to my rebuttal testimony: Document No. SPH-4, NOAA (the National Oceanic and Atmospheric Administration) Attributes Recent Increase in Hurricane Activity to Naturally Occurring Multi-Decadal Climate Variability, dated November 29, 2005; Document No. SPH-5, Reserve Solvency Analysis Results Given $147.1 Million Expected Annual Damage; and Document No. SPH-6, Protection Afforded by $200 Million Initial Reserve Balance Against Frequency Weighted Transmission

& Distribution Damage from Single Saffir-Simpson Hurricane Intensity Scale Category 3 (SSI-3) Storm Landfalls.

Q. Mr. Stewart states that his "analysis indicates that a Storm Damage Reserve Level of $150 million to $200 million is large enough to withstand the damage from most but not all storm seasons over the last 16 years." Do you agree?

A. No. If the annual expected damage to Florida Power & Light Company's ("FPL's") system is equal to the $147.1 million average calculated by Mr. Stewart , then Mr. Stewart's recommended Storm Damage Reserve Level would be expected to fund losses to FPL's system for perhaps one "season" but not "seasons" as he asserts. However, it appears he has used just nominal dollars for the storm damage experienced by FPL, which would not reflect future increases in customer growth or inflation. Customer growth, in particular, has been substantial. Indeed, over the period reviewed by Mr. Stewart, FPL has added approximately 1.2 million customers. By failing to appropriately account for future increases in the value of FPL's system due to customer growth and inflation, Mr. Stewart's $147.1 million 16-year historical average provides an understated estimate of the projected damage.

Q. Why do you think Mr. Stewart's average annual storm damage calculation is roughly twice the expected annual damage of $73.7 million calculated by ABS Consulting?

A. Mr. Stewart uses a 16-year historical record to produce his calculation, whereas ABS Consulting used the long-term 103 year historical hurricane record as the basis for simulation of thousands of synthetic hurricane events and of the long-term estimated annual damage of $73.7 million presented in SPH-1, which is attached to my direct testimony.

Mr. Stewart's average annual storm damage calculation is of interest in that the period of historical data he selected roughly coincides with what is believed by many meteorological experts to be the beginning of a more active period of hurricane formation. Document No. SPH-4, which is attached to my rebuttal testimony, is titled NOAA Attributes Recent Increase in Hurricane Activity to Naturally Occurring Multi-Decadal Climate Variability, dated November 29, 2005. This document addresses the current period of heightened activity that NOAA asserts "has been unfolding in the Atlantic since 1995, and is expected to continue for the next decade or perhaps longer."

Q. Assuming Mr. Stewart's average annual storm damage calculation is correct, how would FPL's Reserve be expected to perform given the funding recommendations proposed by AARP/OPC and FPL respectively?

A. Based on Mr. Stewart's average annual storm damage calculation of $147.1 million and a recommended initial balance of $200 million, the Reserve would be solvent for only one year and would be negative in year two. This is shown on Document No. SPH-5, page 1 of 2. As Document No. SPH-5, page 2 of 2, shows, a $650 million initial balance would be expected to provide some protection from hurricanes for a few years. However, by year five the Reserve would be negative.

Q. What conclusion do you have with respect to the performance of FPL's Storm Reserve given Mr. Stewart's average annual storm damage calculation?

A. OPC and AARP's proposed initial Reserve balance of $200 million would only be adequate to provide protection from storms in the first year. After that, FPL would need to return to the Commission to recover negative balances in the Reserve.

Clearly, if we are in a period of more active hurricane formation with damage near or above the $147.1 million annual estimated by Mr. Stewart, FPL's recommendation of a $650 million initial balance would be inadequate to cover this scale of increased damage.

Q. Using instead the long-term expected annual damage calculated by ABS Consulting, how would the Reserve be expected to perform with the initial balance suggested by Mr. Stewart?

A. Assuming the lower $73.7 million expected annual damage presented in SPH-1, attached to my direct testimony, the Reserve would be depleted after approximately 3 years given a $200 million beginning balance.

Q. Assuming the $200 million initial Reserve balance recommended by Mr. Stewart, would the Reserve be able to cover a single strike from even a Category 3 storm?

A. Not necessarily. As Document No. SPH-6 demonstrates, an initial balance of $200 million would be expected to protect against some SSI-3 storms in the first year. The zero ($0) expected balance at the end of three years would not protect against any storms.

It is important to recognize that in many years FPL experiences multiple storm strikes. The losses for multiple strikes would obviously be greater than the losses for the single strikes depicted in Document No. SPH-6, in which case the Reserve would be depleted sooner.

Q. Based on your analyses, would Mr. Stewart's recommended $200 million initial reserve balance protect against "most but not all storm seasons" as he asserts?

A. No. Assuming the annual damage calculated by Mr. Stewart, the initial Reserve balance he recommends would not protect against more then one storm season. Even assuming the lower long-term expected annual damage calculated by ABS Consulting, the Reserve balance would be zero ($0) at the end of three years.

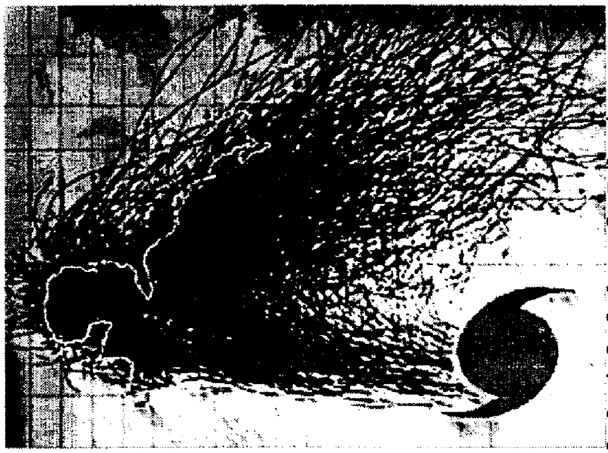
Q. Does this conclude your rebuttal testimony?

A. Yes.

SPH 4

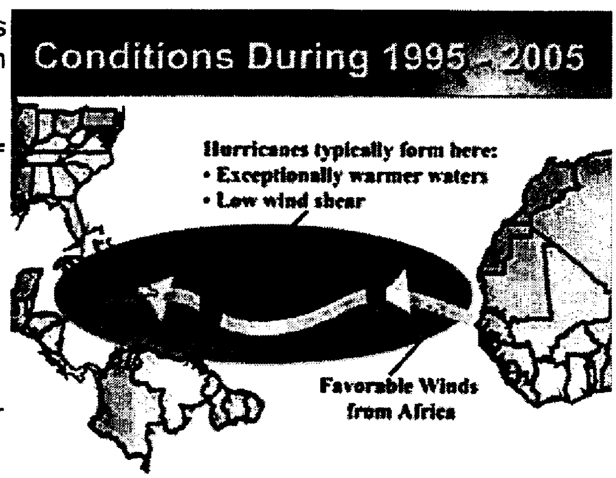
"NOAA Attributes Recent Increase in Hurricane Activity to Naturally Occurring Multi-Decadal Climate Variability", (http://www.magazine.noaa.gov/stories/mag184.htm)

NOAA ATTRIBUTES RECENT INCREASE IN HURRICANE ACTIVITY TO NATURALLY OCCURRING MULTI-DECADAL CLIMATE VARIABILITY



Nov. 29, 2005 — The nation is now wrapping up the 11th year of a new era of heightened Atlantic hurricane activity. This era has been unfolding in the Atlantic since 1995, and is expected to continue for the next decade or perhaps longer. NOAA attributes this increased activity to natural occurring cycles in tropical climate patterns near the equator. These cycles, called "the tropical multi-decadal signal," typically last several decades (20 to 30 years or even longer). As a result, the North Atlantic experiences alternating decades long (20 to 30 year periods or even longer) of above normal or below normal hurricane seasons. NOAA research shows that the tropical multi-decadal signal is causing the increased Atlantic hurricane activity since 1995, and is not related to greenhouse warming. **(Click NOAA image for larger view of North Atlantic tropical storms and hurricanes, 1851 - 2004. Click here for high resolution version. Please credit "NOAA.")**

The tropical multi-decadal signal presents itself in weather events around the world, including Atlantic hurricane variability. The tropical climate patterns producing the increased activity since 1995 are similar to those during the previous active hurricane era of the late 1920s to the late 1960s (1926-1970). These patterns are opposite to the below-normal hurricane era which ran from 1970 to 1994.



Since 1995, the tropical multi-decadal signal has produced lower wind shear (changing winds with height) and warmer waters across the tropical Atlantic, along with conducive winds coming off the west coast of Africa. This key combination of conditions produces active hurricane seasons. **(Click NOAA image for larger view of the tropical Atlantic conditions that have prevailed since 1995. Click here for high resolution version. Please credit "NOAA.")**

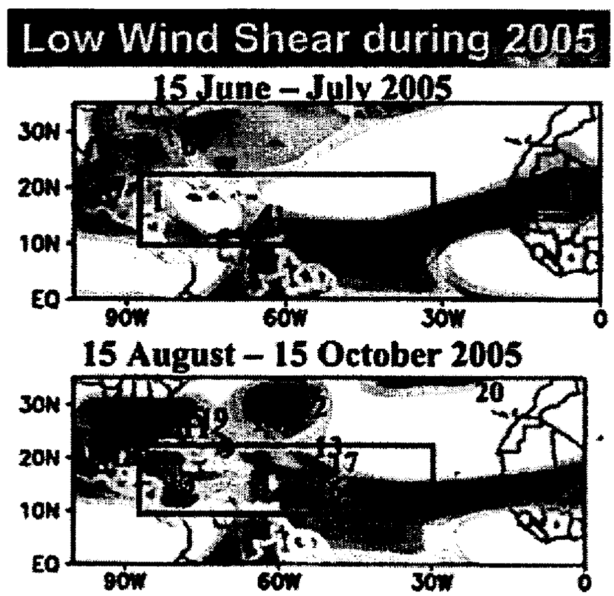
With an active hurricane era comes many more landfalling tropical storms, hurricanes and major hurricanes in the United States. Since 2002, the country has experienced an average of seven landfalling tropical storms and hurricanes per season. The United States can expect ongoing high levels of landfalling tropical storms and hurricanes while we remain in this active era.

Where Hurricanes Form Indicates the Strength of the Season

The strength of the Atlantic hurricane season is largely determined by the number of tropical storms and hurricanes forming between Africa and the Caribbean Sea during the peak months of the season (August through October). This is called the "main development region." Above-normal hurricane seasons and eras, that have prevailed since 1995, occur when many tropical storms and hurricanes form in the main development region. Below-normal seasons and eras, such as 1970-1994, occur when few tropical storms and hurricanes form in this area.

Above-normal hurricane seasons and eras are generally not random, but result from an inter-related set of key atmospheric and oceanic conditions favoring hurricane formation in the main development region. These key conditions have been in place since 1995, and were again present throughout the 2005 season. They include:

- **Warm Ocean Waters:** Hurricanes need warm ocean waters to strengthen and sustain them. Hurricanes do not form unless water temperatures are at least 80 degrees Fahrenheit — hot enough to create atmospheric convection that casts moisture 10 miles up into the atmosphere. Ocean waters were generally two to three degrees Fahrenheit warmer than average during the 2005 season, which favored stronger hurricanes.
- **Low Wind Shear:** Hurricanes can only form in areas of low wind shear, regardless of the ocean temperatures. During 2005, wind shear was very low from the central tropical Atlantic to the Gulf of Mexico. **(Click NOAA image for larger view of the low wind shear that prevailed during the 2005 hurricane season. Click here for high resolution version. Please credit "NOAA.")**



- **Favorable Mid-Level Easterly Winds:** The pattern of easterly winds coming off the west coast of Africa plays a critical role in determining the strength of a hurricane season. During 2005, these winds helped to strengthen tropical low pressure systems moving westward from the African coast. They also steered the low pressure systems westward toward the low-shear, warm-water environment of the main development region, where they transformed into tropical storms and hurricanes.

NOAA's Seasonal Hurricane Outlooks are Based on Two Tropical Climate Factors

NOAA began issuing seasonal Atlantic hurricane outlooks in 1998. These outlooks are a collaborative effort from scientists at the NOAA Climate Prediction Center, NOAA Hurricane Research Division and NOAA National Hurricane Center. NOAA research shows that two prominent climate factors strongly control the key inter-related set of conditions that determine if tropical storms will form in the main development region during August through October. These climate factors are the tropical multi-decadal signal and the El Niño/Southern Oscillation (the El Niño/La Niña cycle).

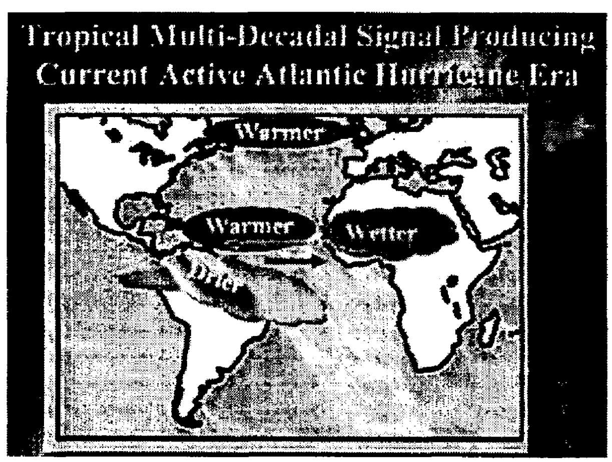
NOAA scientists now understand, monitor and predict these climate factors and their combined affects in a way that was not possible a decade ago. "As a result, NOAA can often confidently predict how conditions will develop across the tropical Atlantic as the season progresses," said Gerry Bell, NOAA's lead seasonal hurricane forecaster at the Climate Prediction Center in Camp Springs, Md. As a result, these outlooks help the nation better prepare for hurricanes.

"NOAA scientists are seeing essentially the same very favorable conditions now that have been present since 1995," said Bell. The tropical multi-decadal signal was again the main contributing factor to the above-normal 2005 Hurricane Season predicted in NOAA's 2005 Hurricane Seasonal Outlook.

"In May, NOAA predicted a 70 percent chance of an above-normal season. In early August, the prediction was updated to a 95-100 percent chance of an above-normal season, with the possibility of a near-record season," said Bell. The 2005 season was the busiest on record in terms of early season activity (it is rare to see major hurricanes develop in July and this year two major hurricanes, Dennis and Emily, both formed in July). It also produced a record 26 tropical storms and a record 13 hurricanes (according to preliminary data). See table below:

2005 Hurricane Season Totals (preliminary data)			
NOAA August 2nd Forecast	**Actual**	**Average**	**Season Record (Season)**
18-21 Tropical Storms	26	11	26 (2005)
9-11 Hurricanes	13	6	13 (2005)
5-7 Major Hurricanes	7	2	8 (1950)

Max Mayfield, director of the Tropical Prediction Center at the National Hurricane Center in Miami, Fla., also heightened awareness of the tropical multi-decadal signal when testifying at a congressional hearing earlier this year (Sept. 20, 2005). He stated that hurricane activity in the Atlantic ebbs and surges in cycles, each of which lasts several decades.



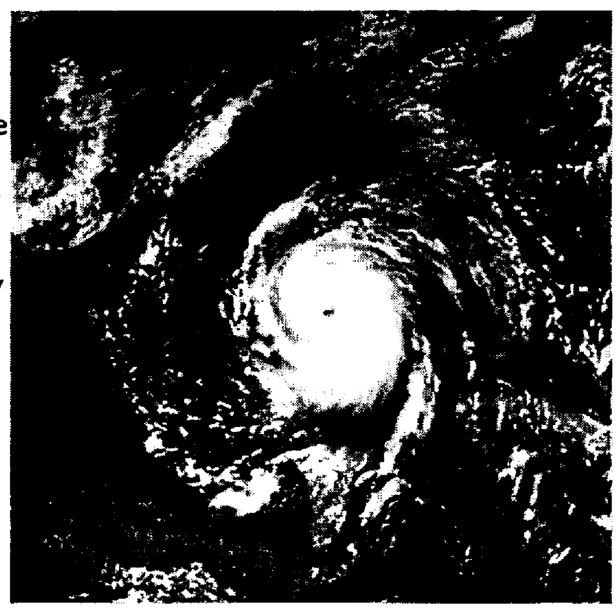
Understanding how the Tropical Multi-Decadal Signal Affects Atlantic Hurricanes
The tropical multi-decadal signal affects atmospheric and oceanic conditions in and around the main development region for decades at a time. Three key aspects of this signal responsible for the increased hurricane activity since 1995 are: 1) warmer than average waters across the tropical Atlantic, 2) a stronger monsoon in the region of West Africa and 3) a

weaker monsoon in the Amazon Basin region. Monsoons are large-scale, seasonal wind and air pressure patterns associated with heavy convective rainfall over a wide region. **(Click NOAA image for larger view of tropical multi-decadal signal producing current active Atlantic hurricane era. Click here for high resolution version. Please credit "NOAA.")**

Convection is the process by which thunderstorms, tropical storms and hurricanes form. It is also an important ingredient of a monsoon system. When convection is strong — warm, moist and unstable air in the lower atmosphere rises to great heights. This rising air cools, forming clouds and rain. However, it remains warmer than its surrounding environment, thus warming the atmosphere. Warmer temperatures lead to higher pressure in the upper atmosphere and lower pressure in the lower atmosphere, which further accelerates the inflow of warm, moist air into the region, and further enhances the outflow in the upper atmosphere, thus sustaining the convection.

In a monsoon region, widespread convection affects the wind, temperature and air pressure patterns well distant from the convection itself. Stronger monsoons features enhanced tropical convection with increased low-level winds flowing into the region and increased upper-level winds flowing out. Weaker monsoons have less tropical convection with decreased low-level inflow and decreased upper-level outflow.

For the combination of an enhanced West African monsoon and a decreased Amazon Basin monsoon, the upper-level winds over the tropical Atlantic are stronger from the east (from Africa toward the Amazon Basin) and lower-level trade winds are weaker from the east. This wind pattern favors more Atlantic hurricanes by producing lower wind shear in the main development region. The enhanced West African monsoon is also associated with favorable winds in the middle atmosphere coming off the west coast of Africa, which are an additional key ingredient of an active hurricane season (see bullet number three above entitled "Favorable Mid-Level Easterly Winds"). All of these conditions were present during 2005.



Research by NOAA scientists Gerry Bell and Muthuvel Chelliah, currently in press with the *Journal of Climate*, describes the tropical multi-decadal signal and shows that it accounts for the entire inter-related set of conditions that controls hurricane activity for decades at a time. Their study also shows that the tropical multi-decadal signal is causing the observed multi-decadal fluctuations in Atlantic hurricane activity since 1950.

These results expanded upon a 2001 study in *Science* by hurricane meteorologist Stanley Goldenberg at the NOAA Atlantic Oceanographic and Meteorological Laboratory's HRD in Miami, Fla.; Chris Landsea, the NOAA Science and Operations Officer at the NOAA National Hurricane Center in Miami, Fla.; Alberto M. Mestas-Nunez of the University of Miami and William M. Gray of Colorado State University, which suggested that "decades-long cycles in sea-surface temperatures and wind shear in the tropical Atlantic closely matched the cycles of major hurricane formation in that region." That study also showed the recent increase in hurricane activity is nothing new. In fact, "Atlantic Ocean temperature data shows that this is just the latest manifestation of a long-running hurricane cycle that dates back to at least 1870," said Landsea. **(Click NOAA satellite image for larger view of Hurricane Katrina taken on Aug. 28, 2005, at 11:45 a.m. EDT, as the powerful storm churned in the Gulf of Mexico as a Category Five storm with sustained winds near 175 mph, a day before the storm made landfall on the U.S. Gulf Coast. Click here for high resolution version. Please credit "NOAA.")**

Knowledge of the tropical multi-decadal signal is relatively new, and more research needs to be done. For example, understanding exactly what triggers a transition to the opposite phase of the signal remains a challenge for future research. Understanding these transitions is limited because most atmospheric data dates back to only 1949.

The El Niño/Southern Oscillation (El Niño/La Niña cycle) is a Second Key Predictor of Seasonal Atlantic Hurricane Activity

Dr. William Gray of Colorado State University discovered in 1984 that El Niño and La Niña episodes strongly influence Atlantic hurricane activity. The El Niño/La Niña cycle is the second predictor used by NOAA to make their seasonal hurricane outlooks. El Niño and La Niña episodes occur roughly every three to five years, and generally last nine to 15 months. El Niño refers to a periodic warming of the ocean waters over the central equatorial Pacific, while La Niña refers to a periodic cooling of those waters. Changes in ocean temperatures in this region are very important, because they alter the patterns of tropical convection across the central and east-central equatorial Pacific. El Niño increases tropical convection in these regions, while La Niña suppresses it.

These changes in tropical convection then affect the wind and air pressure patterns in the upper atmosphere across the eastern half of the tropical Pacific. More important to Atlantic hurricane formation is how they affect the winds in the main development region. El Niño inhibits Atlantic hurricanes by producing upper-level westerly winds and increased wind shear in the main development region. La Niña promotes Atlantic hurricanes by producing upper-level easterly winds and decreased wind shear in the main development region.

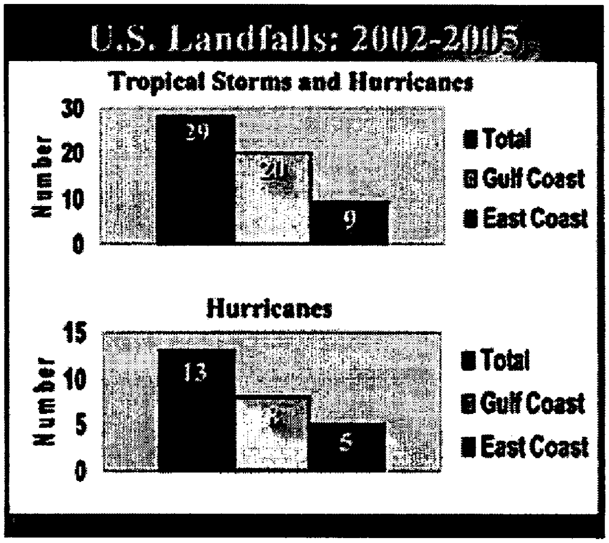
The El Niño and La Niña signals can be masked or accentuated by the tropical multi-decadal signal. For example, the combination of La Niña and an active hurricane era produces conditions most conducive to an extremely active season. Conversely, the La Niña signal was masked to some extent during the inactive 1970-1994 era, as was seen during the marginally above-normal seasons of 1988 and 1989, and during the near-normal seasons of 1984 and 1985.

The combination of El Niño and an inactive hurricane era produces the conditions most conducive to a below-normal season, as was seen during 1970-1994 when every El Niño was associated with well below-normal activity. In contrast, since 1995, all but two seasons have been above normal, these being the two El Niño years of 1997 and 2002, and only the record 1997 El Niño produced a below-normal season. During 2005, neither El Niño nor La Niña was present to affect the season.

Landfalling Hurricanes and Seasonal Landfall Predictions

Below-normal seasons average one landfalling hurricane in the United States, while above-normal seasons average of two to three U.S. hurricane landfalls. This two to three-fold increase is related to the fact that many more hurricanes form in the main development region during above-normal seasons, and are then steered generally westward toward the Caribbean Islands and the United States. As a result, both regions are at a greatly increased risk of hurricane landfalls during above-normal seasons.

Whether or not a tropical storm or hurricane strikes the United States depends critically on the weather patterns present at the time the storm approaches land. For example, when air pressure in the upper atmosphere is higher than normal over the broad region encompassing the southeastern United States, the Gulf of Mexico and the western tropical Atlantic — the wind shear tends to be low in these regions and the steering currents bring stronger hurricanes closer to shore. This high-pressure region is strongly influenced by weather patterns over the United States, which are not predictable beyond a few days. As a result, seasonal hurricane landfall forecasts remain an ongoing challenge, and it is currently not possible to say whether a given locality is more likely to be struck during a given season.



Since 2002, a total of 29 named storms (tropical storms and hurricanes) have struck the United States. This is an average of seven landfalling named storms per season. Over this four year period, twenty named storms have struck the Gulf Coast and nine have struck the East Coast — with an average of five and two storms per season, respectively. For landfalling hurricanes (alone), a total of 13 hurricanes have struck in the United States since 2002. This is an average of three landfalling hurricanes per season. Over this four year period, eight hurricanes have struck the Gulf Coast and five the struck the East Coast — with an average of two and one hurricane per season, respectively. **(Click NOAA image for larger view of U.S. tropical storm and hurricane landfalls: 2002-2005.. Click here for high resolution version. Please credit "NOAA.")**

Coastal Population Growth during the Inactive Hurricane Era 1970-1994
Making matters worse, coastal development thrived in hurricane prone areas of the United States when fewer hurricanes struck during 1970-1994. Almost unprecedented coastal development continues even today. During 1970-1994, the Gulf Coast averaged less than one hurricane landfall per season, and the East Coast averaged one hurricane landfall every five years. This is in sharp contrast to the average of three U.S. hurricane landfalls during very active seasons.

Unfortunately, decisions about land use, construction standards, etc. were previously made based on an erroneous assumption that hurricanes would no longer affect the United States as frequently or as strongly as they had in earlier decades. Since the tropical climate patterns are again favoring very active hurricane seasons, the nation is not only seeing more hurricane landfalls, but more damage and more people affected when one strikes. "We've seen very busy times before, but a big difference now is there are so many people living in Hurricane Alley," said Landsea.

Consensus Among NOAA Hurricane Researchers and Forecasters* (see editor's note)

There is consensus among NOAA hurricane researchers and forecasters that recent increases in hurricane activity are primarily the result of natural fluctuations in the tropical climate system known as the tropical multi-decadal signal. The tropical climate patterns now favoring very active hurricane seasons are similar to those seen in the late 1920s to the late 1960s. The current active hurricane era began in 1995, meaning the nation is now 11 years into an active era that could easily last several decades (20-30 years or even longer). We can expect ongoing high levels of hurricane activity — and very importantly high levels of hurricane landfalls — as long as the active era continues.

As the risk of increased hurricane activity prevails during the next few decades, NOAA will continue to provide the nation with superior hurricane-related products and services. However, one must always remember that it is ultimately your responsibility to prepare for and act appropriately when hurricanes threaten your area. "Preparedness remains essential. Knowing the risks, knowing ahead of time where to go and what to bring if evacuating, and heeding orders from local officials, empowers individuals, businesses and communities," Mayfield said. "The most accurate forecasts are only beneficial when people react by taking the necessary steps to save their lives and property."

***EDITOR'S NOTE:** This consensus in this on-line magazine story represents the views of some NOAA hurricane researchers and forecasters, but does not necessarily represent the views of all NOAA scientists. It was not the intention of this article to discount the presence of a human-induced global warming element or to attempt to claim that such an element is not present. There is a robust, on-going discussion on hurricanes and climate change within NOAA and the scientific community.

The headline and paragraph could have more clearly stated:

"Agreement Among Some NOAA Hurricane Researchers and Forecasters"

There is agreement among a number of NOAA hurricane researchers and forecasters that recent increases in hurricane activity are primarily the result of natural fluctuations in the tropical climate system known as the tropical multi-decadal signal."

***Reference:** Goldenberg, Stanley B., Christopher W. Landsea, Alberto M. Mestas-Nunez, William M. Gray. July 20, 2001. The Recent Increase in Atlantic Hurricane Activity: Causes and Implications. Science, Vol. 293. no. 5529, pp. 474 - 479.*

Docket No. 060038-EI
S.P. Harris, Exhibit No. _____
Document No. SPH-5 Page 1 of 2
Reserve Solvency Analysis Results Given $147.1 Million Expected Annual Damage
$200 million Initial Balance, no accruals, no recovery of negative Reserve balances

Reserve Solvency Analysis Results Given $147.1 Million Expected Annual Damage
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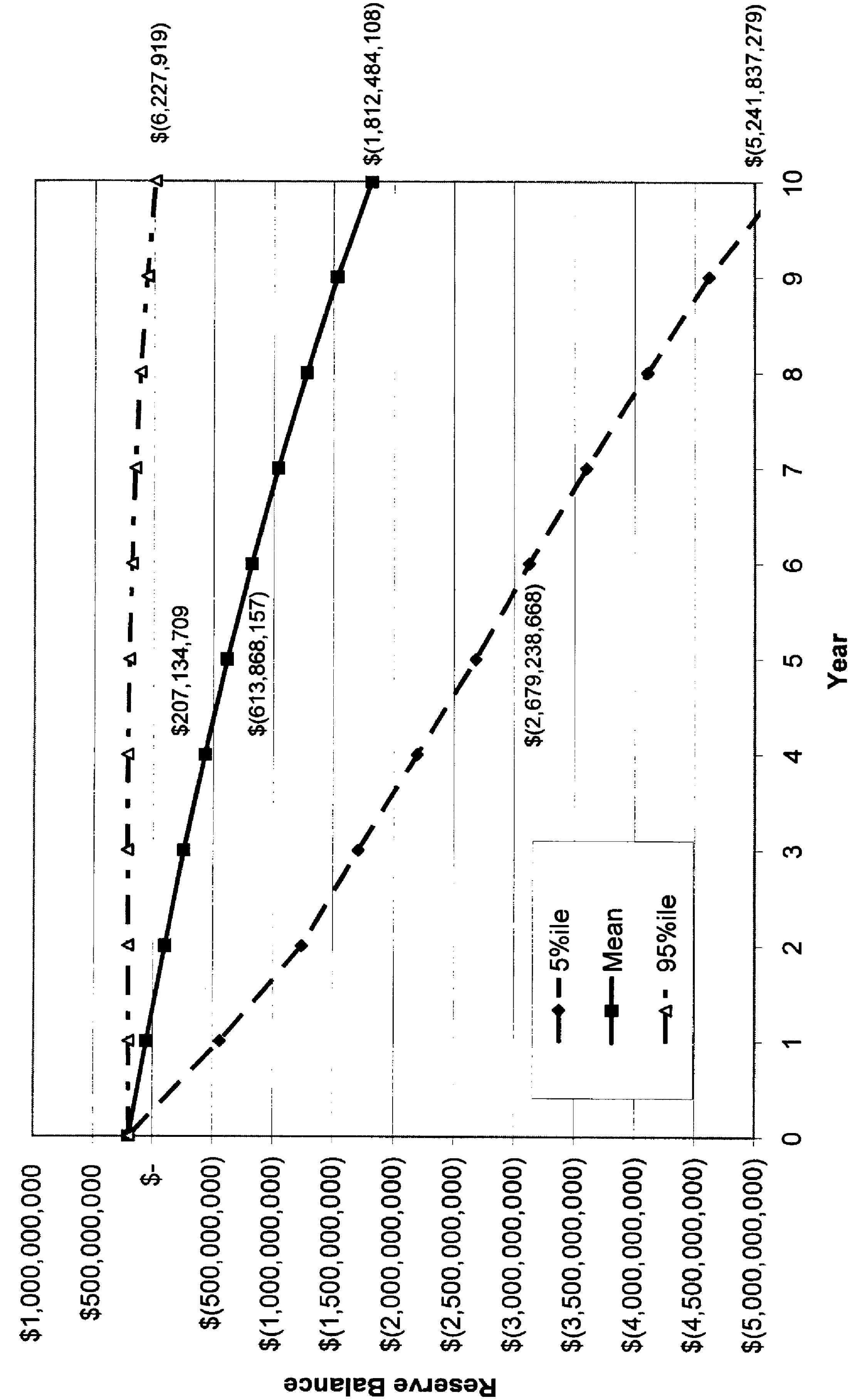
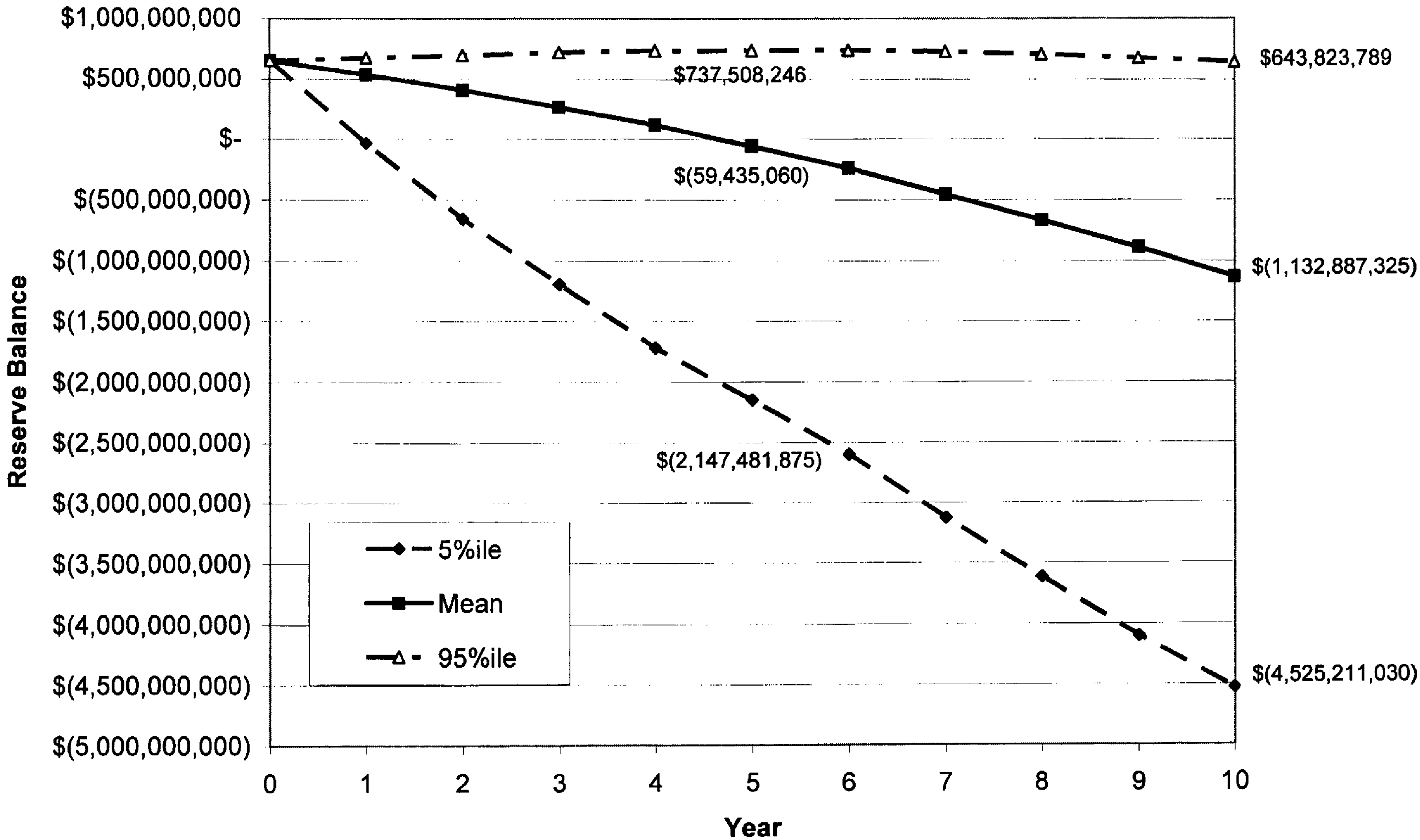


SPH-5

Reserve Solvency Analysis Results Given $147.1 Million Expected Annual Damage
$650 million Initial Balance, no accruals, no recovery of negative Reserve balances



Docket No. 060038-EI
S.P. Harris, Exhibit No. ____
Document No. SPH-5 Page 2 of 2
Reserve Solvency Analysis Results Given $147.1 Million Expected Annual Damage
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Docket No. 060038-EI
S.P. Harris, Exhibit No. _____
Document No. SPH-6, Page 1 of 1
Protection Afforded by $200 Million Initial Reserve Balance Against Frequency Weighted Transmission & Distribution Damage from Single SSI-3 Storm Landfalls