TEXAS WINDSTORM INSURANCE ASSOCIATION
RESIDENTIAL PROPERTY RATE LEVEL REVIEW
July 19, 2019

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Date: July 19, 2019

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INTRODUCTION

The Texas Windstorm Insurance Association (TWIA) has completed studies sufficient to support rate level indications for its residential coverages. This report documents the procedures, methods, assumptions, data and results of this analysis.

DISTRIBUTION AND USE

This report was prepared for internal use by the management of TWIA and for the Board of Directors of TWIA. A complete copy of the report may be submitted to the Texas Department of Insurance (TDI or Department) for use in the approval of a rate change. Use of this report for other than the stated purpose may not be proper and must be preceded by written authorization.

RELIANCE UPON DATA

The following data and information used in this analysis were prepared by TWIA and are the responsibility of TWIA's management:

- TWIA losses and loss adjustment expenses
- TWIA written and earned premiums
- History of rate changes impacting TWIA residential premium
- TWIA's statutory annual statements and insurance expense exhibits.

At the time of this analysis, some of the data was unaudited. The data was reviewed for reasonableness and consistency, and the TWIA written premium and paid loss data provided for this analysis were reconciled to TWIA's annual statements

In addition to TWIA's own data, we utilized insurance industry premium and loss data supplied by the TDI.

We also used the results of two different hurricane simulation models -- one model developed by Applied Insurance Research (AIR) and one model developed by Risk Management Solutions (RMS). Both models utilized TWIA exposure data as of 11/30/2018. TWIA has not directly verified the accuracy of these simulation models, but has relied on documentation provided directly by the modeling firms and submission documentation provided to the Florida Commission on Hurricane Loss Projection Methodology to comply with Actuarial Standard of Practice #38, "Using Models Outside the Actuary's Area of Expertise."

LIMITATIONS

The indicated rate level change as shown in this report represents a reasonable estimate of the rate level necessary to cover the TWIA's expected costs of providing residential wind/hail coverage. The actual costs of providing residential property coverage for a specific year may differ substantially from the indicated rate level range shown in this report. The possibility of this variability arises from the fact that the events covered by TWIA are inherently unpredictable from year to year. The indicated rate level is, however, our best estimate of the expected annual cost of providing residential wind/hail coverage.

This actuarial report provides professional input and guidance to TWIA; however, the final decision regarding implementation and actual rate level change is a Board decision subject to the approval requirements of the Texas Department of Insurance.

The attached exhibits should be considered an integral part of this report.

EXECUTIVE SUMMARY

This section provides a brief synopsis of the key findings and recommendations contained in our study.

1. We have estimated the indicated total rate level change using a combination of two different methodologies for projecting the expected hurricane loss portion of the indicated rate level. The indicated total rate level changes are shown in Exhibit 1 and the following table:

Indicated Rate Change: Long Term Hurricane Methodologies

Hurricane Projection Methodology	Indicated Rate Change
Actual Experience and Models Combined	+42%
Actual Industry Experience	+35%
Hurricane Simulation Models	+48%

The indicated rate change shown is based on a combination of actual industry experience and hurricane simulation models. The indications based on each of these methodologies alone are also shown for reference. All methodologies rely on a long-term view of event frequency to develop the hurricane portion of the indicated rate level.

The hurricane simulation models utilized are widely used for insurance company catastrophe management and ratemaking. Versions of these simulation models have undergone verification by and been approved by the Florida Commission on Hurricane Loss Projection Methodology.

2. The indicated rate level change includes different hurricane projection methodologies. The different methods were used because the actuarial methods used to incorporate hurricane losses into rate indications are still evolving. Traditionally, actuarial methods have been based on insurance industry hurricane loss experience. More recently, actuarial methods have incorporated the results of hurricane simulation models to minimize the weaknesses of the traditional approaches.

The method using actual industry experience relies on a more traditional approach and is based on 53 years of actual insurance industry premiums and losses and 168 years of actual hurricane experience. Severe hurricanes are so relatively infrequent that this limited number of years of actual industry experience may not represent the scope of potential occurrences. Also, the distribution of insured properties has changed dramatically over time with the increased population and building values along the Gulf Coasts. The alternate method incorporates the results of hurricane simulation models. This has the advantage of minimizing many of the theoretical weaknesses of the traditional actuarial methodologies. The overall indication assigns equal weight to these hurricane projection methodologies.

3. The current rate indication is 9% more than the corresponding indication from the prior TWIA residential rate study. Change in the provision for debt service on TWIA's outstanding Class 1 debt securities and changes in modeled loss ratios are the primary reasons for the change.

   Details on the key differences between the current and prior rate indications are described in the Analysis section of this report.

4. The indicated rate changes presented in this report reflect a separate provision for contributions to funding and uncertainties in pricing hurricanes. The total funding and contingency provision is assumed to be equal to 5% of TWIA premium.

   The provision for debt service of 25.1% represents the projected cost of debt service on the Series 2014 Class 1 Pre-Event Bonds. As of June 30, 2018, the available proceeds of the Series 2014 Class 1 Pre-Event Bonds were used to pay claims associated with Hurricanes Harvey.

   The provision for reinsurance expense is 16.6% of TWIA premium. The provision for reinsurance expense reflects the estimated actual net cost of purchasing catastrophe reinsurance (reinsurance premiums paid net of the expected reduction in TWIA retained losses). Catastrophe reinsurance provides TWIA with annually renewable protection against large storm losses.

ACTUARIAL ANALYSIS

Overview of Analysis

The goal of the rate level adequacy review is to compare the current rate level to TWIA's expected costs for providing residential property insurance coverage. This comparison is achieved by estimating the projected loss, loss adjustment expense (LAE), and fixed expense ratio for a prospective accident year and then comparing this ratio to the "permissible" loss, LAE, and fixed expense ratio. The permissible ratio is the portion of premium remaining to pay loss, LAE, and fixed expenses after payment of TWIA variable expenses. If the projected ratio is higher than the permissible ratio, then a rate increase is indicated. If the projected ratio is lower than the permissible, then a rate decrease is indicated.

The steps employed to estimate the projected loss, LAE, and fixed expense ratio are as follows:

1. Adjust historical premium to the current rate level (to facilitate calculation of historical loss ratios at current rates).
2. Determine LAE factors to add projected LAE to projected loss.
3. Estimate the projected non-hurricane loss and LAE ratio.
4. Estimate the projected hurricane loss and LAE ratio.
5. Estimate the projected fixed expense ratio.
6. Sum the projected non-hurricane and hurricane loss ratios and the projected fixed expense ratio to obtain the projected total loss, LAE, and fixed expense ratio.

The steps employed to determine the permissible loss and LAE ratio are as follows:

(a) Analyze historical variable expense to premium ratios to estimate the projected total variable expense ratio.
(b) Subtract the projected total variable expense ratio from 1.00 to derive the permissible loss, LAE and fixed expense ratio.

Steps 1-5 and (a)-(b) are described in more detail in the remainder of this report.

Earned Premium at Current Rates

Historical industry and TWIA earned premium is adjusted to TWIA's current rate level. Earned premium at current rates for prior years permits the calculation of historical loss ratios at the current rate level.

Exhibit 10 shows the calculation of earned premium at current TWIA rates. Industry earned premium was provided by TDI/TICO. Historical TWIA written premium is adjusted to the current rate level and adjusted to an earned basis based on a uniform monthly earning assumption.

Loss Adjustment Expense Factors

In Exhibit 4, the historical ratio of LAE to loss is analyzed to develop LAE factors. Separate LAE factors are developed for hurricane and non-hurricane losses. The hurricane LAE factors are developed based on the LAE to loss ratio for years with hurricanes. The non-hurricane LAE factors are developed based on the ratio for years without hurricanes. TWIA statutory annual statement incurred loss and LAE data is utilized to derive these ratios.

The indicated LAE to loss ratios are shown in Exhibit 4, Sheet 1. For hurricane losses, the indicated LAE ratio of 0.15 is equal to the weighted average of the 10 hurricane years included in the analysis. For non-hurricane losses, the indicated ratio of 0.268 is equal to the weighted average of the most recent 10 non-hurricane years included in the analysis.

The development of these LAE factors is necessary to add LAE to the projected hurricane and non-hurricane loss ratios. The development of these loss ratios is described in the following two sections.

Projected Non-Hurricane Loss and LAE Ratio

Exhibit 2 shows the development of the projected non-hurricane loss and LAE ratio. The loss portion of this ratio is estimated by comparing the indicated ultimate TWIA non-hurricane loss for accident years 2009 - 2018 to the earned premium at current TWIA rates for the same years. The indicated ultimate non-hurricane loss for each year is based on actual TWIA paid loss as of 12/31/18, and the paid loss development method. LAE is then added to each year's ultimate loss through the non-hurricane LAE factor developed in Exhibit 4.

Paid loss development factors are selected based on the current average of all available years and prior selections. Given the positive skewness of the observed age-to-age development factors, a straight average is more appropriate than an average that excludes the highest and lowest observation to avoid understating the expected development.

Each year's estimated ultimate loss and LAE is compared to the earned premium at present rates.

The resulting loss and LAE ratios are then trended forward based on the expected prospective inflation level. The net trend factor is equal to a loss trend offset by a premium trend. The loss trend is calculated using industry-wide construction cost and consumer price indices. Premium trend is derived from historical changes in average written premium at present rates. Both premiums and losses are trended to current levels by applying the actual, historical changes in the appropriate data. Future premium and loss trends are selected based on all available and relevant data. The selected trends are estimates of the future trend between the current and prospective earned and accident dates, and they are not used to trend historical experience to current premium and loss levels.

The resulting loss and LAE ratios for each accident year from 2009 - 2018 form the basis for the indicated projected loss and LAE ratio. The indicated loss and LAE ratio equals the premium-weighted average ratio from the 2009 - 2018 accident period. Given the great variability among individual accident years, a weighted average across the most recent 10 years has been selected to achieve both high stability and credibility.

The all-territory indicated loss and LAE ratio is then calculated as the weighted average of the individual territory loss and LAE ratios. TWIA 2018 written premium is used in the weighted average calculation.

Projected Hurricane Loss and LAE Ratio

Two different methods are used to develop the projected hurricane loss and LAE ratios. The first method is based on insurance industry and meteorological hurricane experience for the last 53 and 168 years, respectively. The other method is based on hurricane simulation models. The "53/168-year" method is utilized because the Texas Insurance Code required until recently the consideration of a 30-year minimum experience period. The simulation method is utilized because it minimizes many of the theoretical weaknesses of the historical method. These weaknesses include:

- A 53-year period is insufficient to measure long-term hurricane intensity.
- A 53-year period of insurance industry experience includes years where land use, population densities, construction techniques and materials, engineering techniques and building codes were different than today. These differences diminish the relevance of insurance data from several decades ago in evaluating today's residential property rates.

Differences between the two methods are the result of expected variances in the frequency and severity of hurricanes, and fundamental differences between the aggregate historical industry exposures and current TWIA exposures. Because of the readily identifiable nature of hurricanes, there should be no double-counting or understatement of expected future losses resulting from the use of either method.

For each method, the projected hurricane loss ratio is estimated first. LAE is added to each loss ratio using the hurricane LAE factor developed in Exhibit 4. Each method's development of the projected hurricane loss ratio is described as follows:

Actual 53/168-Year Industry Hurricane Experience

In Exhibit 6, the reported Texas insurance industry seacoast dwelling extended coverage premium and loss experience for the period 1966 through 2018 is used in the development of a projected hurricane loss ratio. For each year, insurance industry loss ratios at current rates are calculated using information provided by the TDI. For the years where sufficient detail is available (1983 - 2018), these loss ratios are adjusted to TWIA's rate level and re-weighted based on the TWIA's current premium distribution by territory within the seacoast area.

A projected hurricane loss ratio is developed from these 53 years of loss ratios by separating the 53 years into the 14 hurricane years and 39 non-hurricane years. The 39 non-hurricane years are used to develop an estimated non-hurricane loss ratio.

Hurricane loss ratios are then estimated by subtracting the non-hurricane loss ratio from the total loss ratio in each of the thirteen hurricane years. An average hurricane loss ratio for hurricane years is calculated as the average of the 14 hurricane loss ratios: 96.3%.

The 53-year period that underlies the selected hurricane loss ratio has experienced significantly fewer hurricanes than the long-term average. As shown in Exhibit 9, the annual hurricane

frequency during this 53-year period is 0.283, while the annual frequency during the most recent 168-year period is 0.381. The 53-year period represents all years for which TWIA has been provided industry data by TDI. Because the expected frequency of hurricanes is unrelated to the availability of insurance industry data, there is no reason to use only the most recent 53-year period to estimate the expected frequency of hurricane activity. Given the relatively infrequent occurrence of hurricanes, the largest possible experience period should be considered in order to obtain the most credible result. The selected hurricane frequency is therefore set equal to the 168-year historical hurricane frequency. As shown in Exhibit 6, Sheet 1, multiplying the selected loss ratio for hurricane years by the selected hurricane frequency yields a projected hurricane loss ratio of 36.7%.

Hurricane Simulation Models

This projected hurricane loss ratio is determined based on the average result of two different hurricane simulation models. The models versions utilized are AIR Touchstone v6 and RMS RiskLink v18. Both models were run using exposure data provided by TWIA as of 11/30/2018. This exposure data included location-level detail including physical characteristics of each risk and all relevant coverages. Both models were run using historical (long-term) event rates and both results include loss amplification (demand surge) and exclude storm surge and loss adjustment expenses. A separate provision for storm surge was included, equal to 10% of the increase in modeled average annual losses due to the inclusion of storm surge in the model output. The AIR and RMS models generated 4,752 and 9,774 unique events, respectively, with the following distribution of intensity ratings:

Saffir-Simpson Category	AIR	RMS
Category 0	12.8%	48.1%
Category 1	36.3%	14.6%
Category 2	22.9%	12.8%
Category 3	19.0%	13.7%
Category 4	8.2%	10.0%
Category 5	0.8%	0.8%

Events shown as Category 0 include events with no U.S. landfall, Category 0 events making landfall in TX, and events making landfall in neighboring states or Mexico.

As shown in Exhibits 7 and 8, these models yield projected hurricane loss ratios of 53.3% and 50.5%. The average of these loss ratios is 51.9%.

Fixed Expenses and Variable Permissible Loss and LAE Ratio

Exhibit 11 shows the expense assumptions used to develop the projected fixed expense ratio and the variable permissible loss and LAE ratio. Fixed expenses include general expenses, Class 1 public security interest and principal repayment and the net cost of reinsurance (after modeled recoveries). The sum of these projected expenses provides for a 47.9% fixed expense ratio. Variable expenses include commission, taxes, and projected contributions to the Catastrophe Reserve Trust Fund (CRTF) . Subtracting these expenses from 100% yields a permissible loss and LAE ratio of 77.0%.

As stated above, the expenses include a provision for an annual contribution to the CRTF, repayment of Class 1 public securities, and the projected net cost of TWIA's purchasing of reinsurance. The 16.6% provision for reinsurance expense reflects the estimated net actual cost of purchasing reinsurance (reinsurance premiums net of the expected reduction in TWIA retained losses). TWIA's purchasing of reinsurance provides additional current year protection to TWIA and coastal policyholders and TWIA members.

Indicated Rate Change

Exhibit 1 summarizes the indicated rate change using a combination of the two hurricane loss ratio projection methods. The individual indications resulting from the use of each methodology are also shown for reference. The indicated rate change for each method is calculated by dividing the total projected loss, LAE, and fixed expense ratio by the variable permissible loss and LAE ratio. This method of calculating the indicated rate change assumes that TWIA's variable expenses vary proportionally with premium while the fixed expenses do not.

Data Issues

Reconciliation of Data to TWIA's Annual Statements

Exhibit 12 shows a reconciliation of the premium data provided by TWIA to TWIA's annual statement data. This reconciliation shows the differences between the two data sources. Differences of less than 1% exist for all recent years except 2010.

Key Differences Versus Prior Indications

The indicated rate change shown in this report is 10% more than the comparable indication based on the prior (July 2018) study. The reasons for higher indications are summarized in the following table.

Reconciliation of Current vs. Prior Indications

Rate Indication/Reason for Change	Impact of Change	Rate Indication
Previous Rate Indication (Combined Method)		**+32%**
Change in modeled loss ratio	+1%	
Change in outstanding bond repayment provision	+9%	
Change due to all other factors	+0%	
Current Rate Indication (Combined Method)		**+42%**

These reasons are discussed below:

Change in modeled loss ratio

TWIA compares expected annual hurricane loss to in-force premium as of Nov 30, 2018 at present rates for the modeled loss ratio provision. 1% increase brought by change in modeled loss ratio provision may be attributed to version changes of hurricane models or shift in the subject business in-force as of Nov 30, 2018.

Change in outstanding bond repayment provision

The indicated rate change increases approximately 9% as a result of change in outstanding bond repayment provision. The outstanding class 1 public securities were issued in 2014 and had been depleted for paying claims associated Hurricane Harvey. Annual principal and interest payments on the outstanding bond stays the same, while TWIA's business has been shrinking at an annual rate of 10%. And the reduction in business correspondingly resulted in the increase in outstanding bond repayment provision.

SUMMARY OF EXHIBITS

Exhibit Number	Exhibit Title or Purpose
1	Summary of Indicated Rate Change
2	Projected Ultimate Non-Hurricane Loss & LAE Ratio
3	Paid Loss Development Factors and Premium and Loss Trend Analysis
4	Development of LAE Factor
5	Summary of Indicated Hurricane Loss & LAE Ratios
6	Development of Hurricane Loss Ratio – 53/168-Year Method
7	Hurricane Loss Ratio – AIR Model
8	Hurricane Loss Ratio – RMS Model
9	Texas Hurricanes 1899 – 2017
10	Earned Premium at Present Rates
11	Fixed Expenses and Variable Permissible Loss & LAE Ratios
12	Reconciliation of Premium Data to Annual Statement.

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
2019 Rate Level Review

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Residential Property - Wind & Hail
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Residential Property - Wind & Hail
Rate Level Review
Summary of Indicated Rate Change
By Method for Projecting Hurricane Loss & LAE

Exhibit 1

	Indicated Loss & LAE Ratio					Indicated	Proposed
Hurricane Projection Method	Hurricane	Non-Hurricane	Fixed Expenses	Total	Permissible LLAE Ratio	Rate Change	Rate Change
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Using Experience and Models	47.1%	14.2%	47.9%	109.1%	77.0%	+42%	
Using Actual Industry Experience	42.2%	14.2%	47.9%	104.3%	77.0%	+35%	
Using Hurricane Models	51.9%	14.2%	47.9%	114.0%	77.0%	+48%	

Notes:
(2) Exhibit 5
(3) Exhibit 2, Sheet 1
(4) Exhibit 11, Sheet 1
(5) = (2) + (3) + (4)
(6) Exhibit 11, Sheet 1
(7) = (5) / (6) - 1
(8) Selected

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Projected Ultimate Non-Hurricane Loss & LAE Ratio
All Territory Weighted Average

	2018 Written Premium		Indicated Non-Hurricane
Territory	Amount	Share	Loss & LAE Ratio
(1)	(2)	(3)	(4)
Tier 1 - Territory 8	109,856,744	33.3%	11.6%
Tier 1 - Territory 9	59,905,533	18.2%	15.9%
Tier 1 - Territory 10	155,594,490	47.2%	15.5%
Tier 2	4,279,815	1.3%	10.4%
Total / Average	329,636,582	100.0%	14.2%

Notes:
(2) TWIA data
(3) = (2) / (2) Total
(4) Exhibit 2, Sheet 2a - Sheet 2d

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Projected Ultimate Non-Hurricane Loss & LAE Ratio based on TWIA experience
Tier 1 -- Territory 8 (Galveston County)

Accident Year Ending 9/30/xx	Ultimate Non-Hurricane Loss	LAE Factor	Net Trend Factor	Projected Non-Hurricane Loss & LAE	Earned Premium at Current TWIA Rate Level	Indicated Non-Hurricane Loss & LAE Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2009	3,455,233	0.268	1.161	5,086,614	121,162,062	4.2%
2010	1,264,721	0.268	1.161	1,861,856	124,702,532	1.5%
2011	1,277,401	0.268	1.153	1,867,565	126,684,509	1.5%
2012	10,634,874	0.268	1.122	15,130,193	128,914,788	11.7%
2013	54,112,476	0.268	1.114	76,436,686	131,926,783	57.9%
2014	523,227	0.268	1.092	724,489	134,663,386	0.5%
2015	17,728,951	0.268	1.078	24,233,774	136,975,647	17.7%
2016	11,392,452	0.268	1.083	15,644,616	133,431,908	11.7%
2017	2,768,398	0.268	1.064	3,734,990	126,682,785	2.9%
2018	2,609,112	0.268	1.034	3,420,838	115,596,430	3.0%
Total	105,766,845			148,141,621	1,280,740,830	11.6%

Notes:
(2) Exhibit 2, Sheet 3a
(3) Exhibit 4, Sheet 1
(4) Exhibit 2 Sheet 5
(5) = (2) * [1 + (3)] * (4)
(6) Exhibit 10, Sheet 1a
(7) = (5) / (6)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Projected Ultimate Non-Hurricane Loss & LAE Ratio based on TWIA experience
Tier 1 -- Territory 9 (Nueces County)

Accident Year Ending 9/30/xx	Ultimate Non-Hurricane Loss	LAE Factor	Net Trend Factor	Projected Non-Hurricane Loss & LAE	Earned Premium at Current TWIA Rate Level	Indicated Non-Hurricane Loss & LAE Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2009	536,746	0.268	1.161	790,170	65,908,745	1.2%
2010	3,445,556	0.268	1.161	5,072,368	69,035,414	7.3%
2011	19,199,535	0.268	1.153	28,069,797	69,387,124	40.5%
2012	20,626,638	0.268	1.122	29,345,435	70,391,274	41.7%
2013	6,181,885	0.268	1.114	8,732,234	71,513,690	12.2%
2014	1,625,814	0.268	1.092	2,251,193	74,528,934	3.0%
2015	9,564,385	0.268	1.078	13,073,596	77,646,885	16.8%
2016	9,892,632	0.268	1.083	13,584,998	76,688,491	17.7%
2017	8,292,166	0.268	1.064	11,187,392	72,582,595	15.4%
2018	1,223,786	0.268	1.034	1,604,521	65,531,943	2.4%
Total	80,589,143			113,711,704	713,215,095	15.9%

Notes:

(2) Exhibit 2, Sheet 3b
(3) Exhibit 4, Sheet 1
(4) Exhibit 2 Sheet 5
(5) = (2) * [1 + (3)] * (4)
(6) Exhibit 10, Sheet 1b
(7) = (5) / (6)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Projected Ultimate Non-Hurricane Loss & LAE Ratio based on TWIA experience
Tier 1 -- Territory 10 (Other Tier 1)

Accident Year Ending 9/30/xx	Ultimate Non-Hurricane Loss	LAE Factor	Net Trend Factor	Projected Non-Hurricane Loss & LAE	Earned Premium at Current TWIA Rate Level	Indicated Non-Hurricane Loss & LAE Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2009	1,977,943	0.268	1.161	2,911,825	174,677,101	1.7%
2010	6,663,982	0.268	1.161	9,810,368	185,336,084	5.3%
2011	56,124,736	0.268	1.153	82,054,589	193,033,699	42.5%
2012	18,946,421	0.268	1.122	26,954,997	209,220,809	12.9%
2013	4,833,041	0.268	1.114	6,826,922	215,695,773	3.2%
2014	2,858,809	0.268	1.092	3,958,467	222,006,785	1.8%
2015	87,817,897	0.268	1.078	120,038,635	226,666,349	53.0%
2016	12,627,373	0.268	1.083	17,340,464	216,365,340	8.0%
2017	23,713,471	0.268	1.064	31,993,077	197,982,407	16.2%
2018	7,300,788	0.268	1.034	9,572,151	171,091,403	5.6%
Total	222,864,461			311,461,495	2,012,075,750	15.5%

Notes:

(2) Exhibit 2, Sheet 3c
(3) Exhibit 4, Sheet 1
(4) Exhibit 2 Sheet 5
(5) = (2) * [1 + (3)] * (4)
(6) Exhibit 10, Sheet 1c
(7) = (5) / (6)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Projected Ultimate Non-Hurricane Loss & LAE Ratio based on TWIA experience
Tier 2 -- (Territories 1)

Accident Year Ending 9/30/xx	Ultimate Non-Hurricane Loss	LAE Factor	Net Trend Factor	Projected Non-Hurricane Loss & LAE	Earned Premium at Current TWIA Rate Level	Indicated Non-Hurricane Loss & LAE Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2009	551,702	0.268	1.161	812,187	3,324,681	24.4%
2010	182,872	0.268	1.161	269,215	3,606,426	7.5%
2011	54,382	0.268	1.153	79,507	3,878,435	2.0%
2012	259,290	0.268	1.122	368,891	4,306,581	8.6%
2013	503,262	0.268	1.114	710,884	4,573,701	15.5%
2014	30,902	0.268	1.092	42,789	4,650,368	0.9%
2015	328,326	0.268	1.078	448,790	4,748,938	9.5%
2016	463,861	0.268	1.083	636,994	4,776,381	13.3%
2017	526,346	0.268	1.064	710,121	4,657,598	15.2%
2018	304,681	0.268	1.034	399,471	4,410,916	9.1%
Total	3,205,624			4,478,849	42,934,025	10.4%

Notes:
(2) Exhibit 2, Sheet 3d
(3) Exhibit 4, Sheet 1
(4) Exhibit 2 Sheet 5
(5) = (2) * [1 + (3)] * (4)
(6) Exhibit 10, Sheet 1d
(7) = (5) / (6)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Projected Ultimate Non-Hurricane Loss
Tier 1 -- Territory 8 (Galveston County)

Accident Year	TWIA Non-Hurricane Paid Loss	Development Factor	Ultimate Non-Hurricane Loss
(1)	(2)	(3)	(4)
2009	3,455,233	1.000	3,455,233
2010	1,264,721	1.000	1,264,721
2011	1,277,401	1.000	1,277,401
2012	10,634,874	1.000	10,634,874
2013	54,058,418	1.001	54,112,476
2014	520,624	1.005	523,227
2015	17,432,597	1.017	17,728,951
2016	10,964,824	1.039	11,392,452
2017	2,530,528	1.094	2,768,398
2018	2,051,189	1.272	2,609,112
Total	104,190,409		105,766,845

Notes:
(2) Exhibit 2, Sheet 4a, as of 12/31/18
(3) Exhibit 3, Sheet 1
(4) = (2) * (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Projected Ultimate Non-Hurricane Loss
Tier 1 -- Territory 9 (Nueces County)

Accident Year	TWIA Non-Hurricane Paid Loss	Development Factor	Ultimate Non-Hurricane Loss
(1)	(2)	(3)	(4)
2009	536,746	1.000	536,746
2010	3,445,556	1.000	3,445,556
2011	19,199,535	1.000	19,199,535
2012	20,626,638	1.000	20,626,638
2013	6,175,709	1.001	6,181,885
2014	1,617,725	1.005	1,625,814
2015	9,404,508	1.017	9,564,385
2016	9,521,301	1.039	9,892,632
2017	7,579,676	1.094	8,292,166
2018	962,096	1.272	1,223,786
Total	79,069,490		80,589,143

Notes:
(2) Exhibit 2, Sheet 4b, as of 12/31/18
(3) Exhibit 3, Sheet 1
(4) = (2) * (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Projected Ultimate Non-Hurricane Loss
Tier 1 -- Territory 10 (Other Tier 1)

Accident Year	TWIA Non-Hurricane Paid Loss	Development Factor	Ultimate Non-Hurricane Loss
(1)	(2)	(3)	(4)
2009	1,977,943	1.000	1,977,943
2010	6,663,982	1.000	6,663,982
2011	56,124,736	1.000	56,124,736
2012	18,946,421	1.000	18,946,421
2013	4,828,213	1.001	4,833,041
2014	2,844,586	1.005	2,858,809
2015	86,349,948	1.017	87,817,897
2016	12,153,391	1.039	12,627,373
2017	21,675,933	1.094	23,713,471
2018	5,739,613	1.272	7,300,788
Total	217,304,766		222,864,461

Notes:
(2) Exhibit 2, Sheet 4c, as of 12/31/18
(3) Exhibit 3, Sheet 1
(4) = (2) * (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Projected Ultimate Non-Hurricane Loss
Tier 2 -- (Territories 1)

Accident Year	TWIA Non-Hurricane Paid Loss	Development Factor	Ultimate Non-Hurricane Loss
(1)	(2)	(3)	(4)
2009	551,702	1.000	551,702
2010	182,872	1.000	182,872
2011	54,382	1.000	54,382
2012	259,290	1.000	259,290
2013	502,759	1.001	503,262
2014	30,748	1.005	30,902
2015	322,838	1.017	328,326
2016	446,449	1.039	463,861
2017	481,121	1.094	526,346
2018	239,529	1.272	304,681
Total	3,071,690		3,205,624

Notes:
(2) Exhibit 2, Sheet 4d, as of 12/31/18
(3) Exhibit 3, Sheet 1
(4) = (2) * (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Summary of TWIA Historical Paid Loss as of 12/31/18
Tier 1 -- Territory 8 (Galveston County)

Accident Year	Paid Loss Excluding Expense Non-Hurricane	Hurricane	Total
(1)	(2)	(3)	(4)
2009	3,455,233	0	3,455,233
2010	1,264,721	0	1,264,721
2011	1,277,401	0	1,277,401
2012	10,634,874	0	10,634,874
2013	54,058,418	0	54,058,418
2014	520,624	0	520,624
2015	17,432,597	0	17,432,597
2016	10,964,824	0	10,964,824
2017	2,530,528	32,992,606	35,523,134
2018	2,051,189	0	2,051,189
Total	104,190,409	32,992,606	137,183,015

Notes:
(2),(3) Provided by TDI. Accident years ending 9/30/xx
(4) = (2) + (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Summary of TWIA Historical Paid Loss as of 12/31/18
Tier 1 -- Territory 9 (Nueces County)

Accident Year	Paid Loss Excluding Expense Non-Hurricane	Hurricane	Total
(1)	(2)	(3)	(4)
2009	536,746	0	536,746
2010	3,445,556	187,854	3,633,410
2011	19,199,535	0	19,199,535
2012	20,626,638	0	20,626,638
2013	6,175,709	0	6,175,709
2014	1,617,725	0	1,617,725
2015	9,404,508	0	9,404,508
2016	9,521,301	0	9,521,301
2017	7,579,676	226,922,149	234,501,825
2018	962,096	0	962,096
Total	79,069,490	227,110,003	306,179,493

Notes:
(2),(3)Provided by TDI. Accident years ending 9/30/xx
(4) = (2) + (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Summary of TWIA Historical Paid Loss as of 12/31/18
Tier 1 -- Territory 10 (Other Tier 1)

Accident Year	Paid Loss Excluding Expense Non-Hurricane	Hurricane	Total
(1)	(2)	(3)	(4)
2009	1,977,943	0	1,977,943
2010	6,663,982	1,063,585	7,727,567
2011	56,124,736	0	56,124,736
2012	18,946,421	0	18,946,421
2013	4,828,213	0	4,828,213
2014	2,844,586	0	2,844,586
2015	86,349,948	0	86,349,948
2016	12,153,391	0	12,153,391
2017	21,675,933	576,082,050	597,757,983
2018	5,739,613	0	5,739,613
Total	217,304,766	577,145,635	794,450,401

Notes:
(2) (3) Provided by TDI. Accident years ending 9/30/xx
(4) = (2) + (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Summary of TWIA Historical Paid Loss as of 12/31/18
Tier 2 -- (Territories 1)

Accident Year	Paid Loss Excluding Expense: Non-Hurricane	Hurricane	Total
(1)	(2)	(3)	(4)
2009	551,702	0	551,702
2010	182,872	0	182,872
2011	54,382	0	54,382
2012	259,290	0	259,290
2013	502,759	0	502,759
2014	30,748	0	30,748
2015	322,838	0	322,838
2016	446,449	0	446,449
2017	481,121	3,162,101	3,643,222
2018	239,529	0	239,529
Total	3,071,690	3,162,101	6,233,791

Notes:
(2) (3) Provided by TDI. Accident years ending 9/30/xx
(4) = (2) + (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Calculation of Net Trend Factors

Year / Quarter	Average Writen premium Per house year At present rates
(1)	(2)
2010 / 3	1,615.07
2011 / 3	1,611.18
2012 / 3	1,600.24
2013 / 3	1,631.23
2014 / 3	1,649.95
2015 / 3	1,664.45
2016 / 3	1,667.78
2017 / 3	1,656.10
2018 / 3	1,660.23

(3)	Current Average Earned Date	7/1/2018
(4)	Current Average Accident Date	7/1/2018
(5)	Prospective Average Earned / Accident Date	1/1/2021
(6)	Premium Trend Length	2.500
(7)	Loss Trend Length	2.500
(8)	Selected Premium Trend	0.0%
(9)	Selected Loss Trend	1.3%

Accident Year	Current Premium Trend	Current Loss Trend	Prospective Premium Trend	Prospective Loss Trend	Net Trend Factor
(10)	(11)	(12)	(13)	(14)	(15)
2009	1.028	1.155	0.999	1.033	1.161
2010	1.028	1.155	0.999	1.033	1.161
2011	1.030	1.149	0.999	1.033	1.153
2012	1.037	1.126	0.999	1.033	1.122
2013	1.018	1.097	0.999	1.033	1.114
2014	1.006	1.063	0.999	1.033	1.092
2015	0.997	1.040	0.999	1.033	1.078
2016	0.995	1.043	0.999	1.033	1.083
2017	1.002	1.032	0.999	1.033	1.064
2018	1.000	1.000	0.999	1.033	1.034

Notes:

(2) Exhibit 3, Sheet 2 (6)
(3) Latest Year / Quarter Ending Date - 6 Months
(4) Latest Accident Year Ending Date - 6 Months
(5) Rate Effective Date + 12 Months
(6) = (5) - (3)
(7) = (5) - (4)
(8) Exhibit 3, Sheet 2
(9) Exhibit 3, Sheet 3a
(11) = (2) Indexed to 2018 / 3
(12) Exhibit 3, Sheet 3a
(13) = [1 + (8)] ^ (6)
(14) = [1 + (9)] ^ (7)
(15) = [(12) * (14)] / [(11) * (13)]

Texas Windstorm Insurance Association Exhibit 3
Residential Property - Wind & Hail Sheet 1
Rate Level Review
Paid Loss Development Factors
Statewide Industry Extended Coverage Dwelling Paid Loss

Months of Development

Accident Year	15	27	39	51	63	75	87	99	111
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2009	114,845	136,583	139,262	140,625	140,941	141,037	141,064	141,075	141,084
2010	63,706	70,824	72,510	73,282	73,407	73,508	73,530	73,536	73,536
2011	137,269	154,006	156,583	157,456	157,929	157,995	158,032	158,046	
2012	162,844	196,788	232,373	242,523	245,227	246,785	247,419		
2013	124,050	143,359	151,995	154,466	156,218	156,541			
2014	151,510	178,253	187,490	191,068	191,825				
2015	173,851	200,069	206,343	208,327					
2016	486,124	553,332	561,570						
2017	634,033	775,472							
2018	181,011								

Development Factors

Accident Year	15 - 27	27 - 39	39 - 51	51 - 63	63 - 75	75 - 87	87 - 99	99 - 111	111 - Ult
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2009	1.189	1.020	1.010	1.002	1.001	1.000	1.000	1.000	
2010	1.112	1.024	1.011	1.002	1.001	1.000	1.000	1.000	
2011	1.122	1.017	1.006	1.003	1.000	1.000	1.000		
2012	1.208	1.181	1.044	1.011	1.006	1.003			
2013	1.156	1.060	1.016	1.011	1.002				
2014	1.177	1.052	1.019	1.004					
2015	1.151	1.031	1.010						
2016	1.138	1.015							
2017	1.223								
Average	1.164	1.050	1.016	1.006	1.002	1.001	1.000	1.000	
Avg 5 Year	1.169	1.068	1.019	1.006	1.002	1.001	1.000	1.000	
Prior	1.162	1.055	1.026	1.019	1.006	1.000	1.001	1.000	1.000
Selected	1.163	1.052	1.021	1.012	1.004	1.001	1.000	1.000	1.000
Selected Cumulative	1.272	1.094	1.039	1.017	1.005	1.001	1.000	1.000	1.000

Notes:
Provided by TICO. Accident years ending 9/30/xx

Texas Windstorm Insurance Association Exhibit 3
Residential Property - Wind & Hail Sheet 1
Rate Level Review
Incurred Loss Development Factors
Statewide Industry Extended Coverage Dwelling Paid Loss

	Months of Development								
Accident Year	15	27	39	51	63	75	87	99	111
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2009	120,734	137,926	139,542	140,871	140,966	141,041	141,071	141,078	141,084
2010	66,045	71,578	72,984	73,568	73,599	73,573	73,530	73,536	73,536
2011	143,685	155,082	157,261	157,739	158,014	157,995	158,050	158,046	
2012	170,023	203,480	240,439	246,180	247,027	247,422	247,520		
2013	127,453	147,009	154,930	155,922	156,569	156,577			
2014	157,426	183,366	190,278	191,866	192,056				
2015	183,266	204,239	208,541	209,008					
2016	498,092	556,120	562,298						
2017	665,247	791,814							
2018	186,500								

	Development Factors								
Accident Year	15 - 27	27 - 39	39 - 51	51 - 63	63 - 75	75 - 87	87 - 99	99 - 111	111 - Ult
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2009	1.142	1.012	1.010	1.001	1.001	1.000	1.000	1.000	1.000
2010	1.084	1.020	1.008	1.000	1.000	0.999	1.000	1.000	
2011	1.079	1.014	1.003	1.002	1.000	1.000	1.000		
2012	1.197	1.182	1.024	1.003	1.002	1.000			
2013	1.153	1.054	1.006	1.004	1.000				
2014	1.165	1.038	1.008	1.001					
2015	1.114	1.021	1.002						
2016	1.117	1.011							
2017	1.190								
Average	1.138	1.044	1.009	1.002	1.000	1.000	1.000	1.000	1.000
Avg 5 Year	1.148	1.061	1.009	1.002	1.000	1.000	1.000	1.000	
Prior									
Selected	1.138	1.044	1.009	1.002	1.000	1.000	1.000	1.000	1.000
Cumulative	1.201	1.055	1.011	1.002	1.000	1.000	1.000	1.000	1.000
Selected Cumulative	1.201	1.055	1.011	1.002	1.000	1.000	1.000	1.000	1.000

Notes:
Provided by TICO. Accident years ending 9/30/xx

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Premium Trend Analysis
TWIA Residential Earned Premium at Present Rates

Year / Quarter	Exposure Written	Written Premium	On-Level Factors	Written Premium at Present Rates	Average Written Premium at Present Rates Quarterly	Average Written Premium at Present Rates Four Quarter Ending	Exponential Fitted Trends All-Year	5-Year	4-Year	3-Year
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2009 / 2	68,548	80,599,479	1.407	113,411,561	1,654					
2009 / 3	76,008	89,719,305	1.407	126,244,072	1,661					
2009 / 4	48,007	56,402,471	1.407	79,363,941	1,653					
2010 / 1	47,026	54,587,932	1.407	76,810,702	1,633	1,652	1612.3			
2010 / 2	72,174	82,603,320	1.407	116,231,166	1,610	1,639	1613.5			
2010 / 3	80,037	91,866,506	1.407	129,265,399	1,615	1,625	1614.8			
2010 / 4	50,797	58,863,267	1.407	82,826,528	1,631	1,620	1616.1			
2011 / 1	49,776	59,951,748	1.340	80,341,076	1,614	1,617	1617.3			
2011 / 2	75,601	90,742,856	1.340	121,604,106	1,608	1,616	1618.6			
2011 / 3	82,435	99,110,457	1.340	132,817,491	1,611	1,615	1619.9			
2011 / 4	54,497	66,729,933	1.340	89,424,492	1,641	1,617	1621.1			
2012 / 1	54,769	68,658,174	1.276	87,627,162	1,600	1,614	1622.4			
2012 / 2	77,155	96,214,511	1.276	122,796,806	1,592	1,609	1623.7			
2012 / 3	89,431	112,131,482	1.276	143,111,343	1,600	1,606	1625.0			
2012 / 4	54,952	70,018,382	1.276	89,363,170	1,626	1,603	1626.2			
2013 / 1	54,742	71,740,155	1.216	87,200,607	1,593	1,602	1627.5			
2013 / 2	82,182	108,632,729	1.216	132,043,761	1,607	1,606	1628.8			
2013 / 3	83,114	111,540,208	1.216	135,577,820	1,631	1,615	1630.1			
2013 / 4	60,544	81,734,680	1.216	99,349,014	1,641	1,619	1631.3			
2014 / 1	55,592	77,867,785	1.158	90,141,695	1,621	1,624	1632.6	1640.0		
2014 / 2	79,155	111,616,003	1.158	129,209,475	1,632	1,632	1633.9	1640.9		
2014 / 3	89,874	128,096,479	1.158	148,287,687	1,650	1,638	1635.2	1641.8		
2014 / 4	60,646	86,711,448	1.158	100,379,340	1,655	1,641	1636.5	1642.7		
2015 / 1	57,651	85,327,979	1.103	94,074,097	1,632	1,643	1637.8	1643.6	1653.1	
2015 / 2	82,158	122,581,230	1.103	135,145,806	1,645	1,646	1639.0	1644.5	1653.0	
2015 / 3	84,402	127,421,809	1.103	140,482,544	1,664	1,650	1640.3	1645.5	1652.9	
2015 / 4	57,308	87,342,988	1.103	96,295,644	1,680	1,655	1641.6	1646.4	1652.8	
2016 / 1	54,113	84,557,230	1.050	88,785,092	1,641	1,657	1642.9	1647.3	1652.7	1660.5
2016 / 2	79,991	125,845,764	1.050	132,138,052	1,652	1,659	1644.2	1648.2	1652.7	1659.3
2016 / 3	77,932	123,784,247	1.050	129,973,459	1,668	1,660	1645.5	1649.1	1652.6	1658.0
2016 / 4	51,030	81,959,449	1.050	86,057,421	1,686	1,661	1646.8	1650.0	1652.5	1656.8
2017 / 1	50,991	79,037,984	1.050	82,989,883	1,628	1,659	1648.1	1650.9	1652.4	1655.6
2017 / 2	73,614	114,547,681	1.050	120,275,065	1,634	1,654	1649.3	1651.9	1652.3	1654.4
2017 / 3	68,864	108,614,623	1.050	114,045,354	1,656	1,650	1650.6	1652.8	1652.2	1653.2
2017 / 4	45,960	73,697,340	1.050	77,382,207	1,684	1,648	1651.9	1653.7	1652.2	1651.9
2018 / 1	44,101	71,679,332	1.000	71,679,332	1,625	1,649	1653.2	1654.6	1652.1	1650.7
2018 / 2	63,851	104,163,394	1.000	104,163,394	1,631	1,649	1654.5	1655.5	1652.0	1649.5
2018 / 3	61,408	101,951,681	1.000	101,951,681	1,660	1,650	1655.8	1656.4	1651.9	1648.3
2018 / 4	40,418	68,300,637	1.000	68,300,637	1,690	1,650	1657.1	1657.4	1651.8	1647.0
(14) Average Annual Change							0.3%	0.2%	0.0%	-0.3%
(15) Correlation Coefficient							48.3%	31.2%	0.5%	72.8%
(16) Selected Premium Trend										0.0%

Notes:
(2) Provided by TWIA
(3) Provided by TWIA
(4) Cumulative effect of annual rate changes
(5) = (3) * (4) Indexed to 2018 / 4
(6) = (5) / (2)
(7) annualized average written premium
(8) - (11) = (6) fitted to an exponential distribution
(14) Fitted average annual change
(15) Evaluates the predictability of the fitted curve
(16) Selected based on judgment

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Loss Trend Analysis
Summary of Indices and Calculation of Prospective Loss Costs

Calendar Year Ending 9/30/xx	Statewide Boeckh	Coastal Boeckh	Modified CPI	Weighted Average
(1)	(2)	(3)	(4)	(5)
2009	1.181	1.176	1.091	1.155
2010	1.177	1.175	1.095	1.155
2011	1.163	1.171	1.084	1.149
2012	1.138	1.148	1.060	1.126
2013	1.103	1.111	1.053	1.097
2014	1.069	1.070	1.043	1.063
2015	1.042	1.044	1.029	1.040
2016	1.049	1.052	1.015	1.043
2017	1.037	1.040	1.007	1.032
2018	1.000	1.000	1.000	1.000
Factors to Adjust For Prospective Loss Costs				
(6) Fitted Trend	1.4%	1.4%	1.1%	1.3%
(7) Cost Factor	1.039	1.039	1.031	1.036

Notes:
(2) = Exhibit 3, Sheet 3b trended forward to 9/30/2018
(3) = Exhibit 3, Sheet 3c trended forward to 9/30/2018
(4) = Exhibit 3, Sheet 3d
(5) = 25% CPI and 75% Boeckh (most appropriate available by year)
(6) = (2) - (5) fitted to an exponential curve using 5 years' data
(7) = [1 + (6)] ^ 2.75 (trended from 4/1/2018 to 1/1/2021)

Texas Windstorm Insurance Association Exhibit 3
Residential Property - Wind & Hail Sheet 3b
Rate Level Review
Loss Trend Analysis
Boeckh Residential Construction Index Trend (Statewide)

Calendar Year Ending	Texas Statewide Index	Fitted Trends All Years Linear	All Years Exponential	5 Years Linear	5 Years Exponential	4 Years Linear	4 Years Exponential	3 Years Linear	3 Years Exponential
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
3/31/2009	2017.74	1997.07	2003.02						
6/30/2009	2034.78	2007.67	2012.68						
9/30/2009	2043.22	2018.27	2022.40						
12/31/2009	2046.48	2028.86	2032.15						
3/31/2010	2047.16	2039.46	2041.96						
6/30/2010	2046.06	2050.05	2051.82						
9/30/2010	2050.43	2060.65	2061.72						
12/31/2010	2057.86	2071.25	2071.67						
3/31/2011	2065.01	2081.84	2081.67						
6/30/2011	2070.12	2092.44	2091.71						
9/30/2011	2075.68	2103.04	2101.81						
12/31/2011	2083.08	2113.63	2111.95						
3/31/2012	2092.60	2124.23	2122.14						
6/30/2012	2103.60	2134.82	2132.38						
9/30/2012	2121.39	2145.42	2142.67						
12/31/2012	2139.89	2156.02	2153.01						
3/31/2013	2155.38	2166.61	2163.40						
6/30/2013	2172.48	2177.21	2173.84						
9/30/2013	2188.26	2187.81	2184.33						
12/31/2013	2202.59	2198.40	2194.88						
3/31/2014	2219.60	2209.00	2205.47	2239.79	2240.75				
6/30/2014	2238.93	2219.59	2216.11	2247.89	2248.57				
9/30/2014	2257.35	2230.19	2226.81	2255.99	2256.41				
12/31/2014	2275.49	2240.79	2237.55	2264.08	2264.28				
3/31/2015	2293.52	2251.38	2248.35	2272.18	2272.18	2277.98	2278.82		
6/30/2015	2307.48	2261.98	2259.20	2280.28	2280.11	2285.44	2286.04		
9/30/2015	2315.94	2272.58	2270.10	2288.37	2288.06	2292.90	2293.28		
12/31/2015	2319.83	2283.17	2281.06	2296.47	2296.04	2300.36	2300.55		
3/31/2016	2316.36	2293.77	2292.07	2304.57	2304.05	2307.82	2307.84	2276.75	2277.68
6/30/2016	2308.33	2304.36	2303.13	2312.66	2312.09	2315.28	2315.15	2288.64	2289.19
9/30/2016	2301.17	2314.96	2314.24	2320.76	2320.16	2322.74	2322.49	2300.54	2300.76
12/31/2016	2296.45	2325.56	2325.41	2328.85	2328.25	2330.20	2329.85	2312.43	2312.39
3/31/2017	2299.30	2336.15	2336.63	2336.95	2336.37	2337.66	2337.23	2324.33	2324.07
6/30/2017	2309.66	2346.75	2347.91	2345.05	2344.52	2345.12	2344.64	2336.22	2335.82
9/30/2017	2326.19	2357.35	2359.24	2353.14	2352.70	2352.58	2352.07	2348.12	2347.62
12/31/2017	2343.70	2367.94	2370.63	2361.24	2360.91	2360.04	2359.52	2360.02	2359.49
3/31/2018	2363.63	2378.54	2382.07	2369.34	2369.14	2367.50	2367.00	2371.91	2371.41
6/30/2018	2386.87	2389.13	2393.56	2377.43	2377.41	2374.96	2374.50	2383.81	2383.40
9/30/2018	2413.40	2399.73	2405.11	2385.53	2385.70	2382.42	2382.02	2395.70	2395.44
12/31/2018	2441.00	2410.33	2416.72	2393.63	2394.02	2389.87	2389.57	2407.60	2407.55
Annual Trend		1.8%	1.9%	1.4%	1.4%	1.2%	1.3%	2.0%	2.0%
R-Squared		0.961	0.961	0.790	0.794	0.637	0.639	0.777	0.779

Notes:
(2) = Average Index for Austin, Corpus Christi, Dallas, El Paso, Fort Worth, Houston, Odessa, and San Antonio
(3) - (10) = (2) fitted to linear and exponential distributions

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Loss Trend Analysis
Boeckh Residential Construction Index Trend (Coastal)

Exhibit 3
Sheet 3c

Calendar Year Ending	Texas Coastal Index	Fitted Trends All Years Linear	All Years Exponential	5 Years Linear	5 Years Exponential	4 Years Linear	4 Years Exponential	3 Years Linear	3 Years Exponential
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
3/31/2009	2036.37	2008.85	2015.14						
6/30/2009	2055.55	2019.48	2024.83						
9/30/2009	2068.58	2030.12	2034.56						
12/31/2009	2075.34	2040.75	2044.33						
3/31/2010	2075.01	2051.39	2054.16						
6/30/2010	2072.68	2062.02	2064.03						
9/30/2010	2070.90	2072.65	2073.95						
12/31/2010	2070.54	2083.29	2083.91						
3/31/2011	2073.35	2093.92	2093.93						
6/30/2011	2074.41	2104.55	2103.99						
9/30/2011	2078.04	2115.19	2114.10						
12/31/2011	2083.41	2125.82	2124.26						
3/31/2012	2089.91	2136.45	2134.47						
6/30/2012	2099.29	2147.09	2144.73						
9/30/2012	2118.77	2157.72	2155.03						
12/31/2012	2139.83	2168.36	2165.39						
3/31/2013	2157.69	2178.99	2175.79						
6/30/2013	2175.59	2189.62	2186.25						
9/30/2013	2189.58	2200.26	2196.76						
12/31/2013	2203.33	2210.89	2207.31						
3/31/2014	2227.66	2221.52	2217.92	2252.48	2253.54				
6/30/2014	2252.59	2232.16	2228.58	2260.86	2261.61				
9/30/2014	2274.95	2242.79	2239.29	2269.23	2269.71				
12/31/2014	2296.72	2253.42	2250.05	2277.60	2277.83				
3/31/2015	2310.53	2264.06	2260.86	2285.97	2285.99	2289.91	2290.87		
6/30/2015	2322.48	2274.69	2271.72	2294.34	2294.17	2297.82	2298.51		
9/30/2015	2330.34	2285.32	2282.64	2302.71	2302.38	2305.73	2306.18		
12/31/2015	2333.21	2295.96	2293.61	2311.08	2310.62	2313.65	2313.87		
3/31/2016	2328.60	2306.59	2304.63	2319.45	2318.90	2321.56	2321.59	2286.52	2287.62
6/30/2016	2320.74	2317.23	2315.71	2327.82	2327.20	2329.47	2329.34	2299.45	2300.10
9/30/2016	2313.53	2327.86	2326.83	2336.19	2335.53	2337.39	2337.11	2312.38	2312.64
12/31/2016	2308.10	2338.49	2338.02	2344.56	2343.89	2345.30	2344.90	2325.31	2325.26
3/31/2017	2311.17	2349.13	2349.25	2352.93	2352.28	2353.22	2352.72	2338.24	2337.94
6/30/2017	2323.72	2359.76	2360.54	2361.30	2360.70	2361.13	2360.57	2351.17	2350.70
9/30/2017	2340.72	2370.39	2371.88	2369.67	2369.15	2369.04	2368.45	2364.10	2363.52
12/31/2017	2360.00	2381.03	2383.28	2378.04	2377.63	2376.96	2376.35	2377.03	2376.41
3/31/2018	2380.24	2391.66	2394.73	2386.41	2386.14	2384.87	2384.28	2389.96	2389.37
6/30/2018	2404.05	2402.29	2406.24	2394.78	2394.69	2392.79	2392.23	2402.89	2402.40
9/30/2018	2433.21	2412.93	2417.81	2403.15	2403.26	2400.70	2400.21	2415.82	2415.51
12/31/2018	2467.50	2423.56	2429.42	2411.52	2411.86	2408.61	2408.22	2428.75	2428.68
Annual Trend		1.8%	1.9%	1.4%	1.4%	1.3%	1.3%	2.1%	2.2%
R-Squared		0.942	0.944	0.767	0.770	0.620	0.622	0.780	0.782

Notes:
(2) = Average Index for Corpus Christi and Houston
(3) - (10) = (2) fitted to linear and exponential distributions

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Loss Trend Analysis
Modified Consumer Price Index - External Trend

Exhibit 3
Sheet 3d

		Fitted Trends							
Calendar Year	Modified	All Years		5 Years		4 Years		3 Years	
Ending	CPI	Linear	Exponential	Linear	Exponential	Linear	Exponential	Linear	Exponential
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
9/30/2008	181.04	176.86	177.03						
12/31/2008	181.06	177.32	177.47						
3/31/2009	180.55	177.79	177.92						
6/30/2009	180.07	178.26	178.37						
9/30/2009	179.30	178.73	178.81						
12/31/2009	178.80	179.20	179.26						
3/31/2010	178.46	179.67	179.71						
6/30/2010	178.56	180.14	180.16						
9/30/2010	178.59	180.60	180.62						
12/31/2010	178.72	181.07	181.07						
3/31/2011	178.97	181.54	181.53						
6/30/2011	179.61	182.01	181.98						
9/30/2011	180.52	182.48	182.44						
12/31/2011	181.55	182.95	182.90						
3/31/2012	182.78	183.42	183.36						
6/30/2012	183.87	183.88	183.82						
9/30/2012	184.57	184.35	184.28						
12/31/2012	185.03	184.82	184.74						
3/31/2013	185.38	185.29	185.21						
6/30/2013	185.51	185.76	185.67						
9/30/2013	185.82	186.23	186.14						
12/31/2013	186.03	186.70	186.60						
3/31/2014	186.43	187.16	187.07	187.00	187.03				
6/30/2014	186.87	187.63	187.54	187.51	187.52				
9/30/2014	187.59	188.10	188.01	188.01	188.02				
12/31/2014	188.62	188.57	188.49	188.52	188.52				
3/31/2015	189.46	189.04	188.96	189.03	189.02	189.49	189.50		
6/30/2015	189.59	189.51	189.43	189.54	189.53	189.95	189.96		
9/30/2015	190.03	189.98	189.91	190.05	190.03	190.41	190.41		
12/31/2015	190.50	190.44	190.39	190.56	190.54	190.87	190.87		
3/31/2016	190.95	190.91	190.86	191.07	191.04	191.33	191.32	191.76	191.76
6/30/2016	192.03	191.38	191.34	191.58	191.55	191.79	191.78	192.16	192.16
9/30/2016	192.82	191.85	191.82	192.08	192.06	192.25	192.24	192.56	192.56
12/31/2016	193.56	192.32	192.31	192.59	192.57	192.71	192.70	192.96	192.95
3/31/2017	193.86	192.79	192.79	193.10	193.09	193.17	193.16	193.36	193.35
6/30/2017	194.07	193.26	193.27	193.61	193.60	193.63	193.62	193.76	193.75
9/30/2017	194.20	193.72	193.76	194.12	194.11	194.09	194.09	194.16	194.15
12/31/2017	194.18	194.19	194.25	194.63	194.63	194.56	194.55	194.56	194.56
3/31/2018	194.71	194.66	194.73	195.14	195.15	195.02	195.02	194.96	194.96
6/30/2018	195.24	195.13	195.22	195.65	195.67	195.48	195.48	195.36	195.36
9/30/2018	195.63	195.60	195.71	196.15	196.19	195.94	195.95	195.76	195.77
12/31/2018	196.26	196.07	196.20	196.66	196.71	196.40	196.42	196.16	196.17
Annual Trend		1.0%	1.0%	1.0%	1.1%	0.9%	1.0%	0.8%	0.8%
R-Squared		0.943	0.942	0.974	0.973	0.964	0.963	0.931	0.930

Notes:
(2) = Weighted average of CPI for Lodging, Apparel, Furnishings, and Medical Care
(3) - (10) = (2) fitted to linear and exponential distributions

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Development of LAE factor Using TWIA Commercial + Residential Experience

Accident Year	Projected Ultimate Loss	Projected Ultimate LAE	Ultimate LAE to Loss Ratio	Hurricane Indicator
(1)	(2)	(3)	(4)	(5)
1980	12,911	1,318	0.102	H
1981	2,512	543	0.216	
1982	796	565	0.710	
1983	148,999	9,127	0.061	H
1984	999	324	0.324	
1985	512	297	0.580	
1986	881	505	0.573	H
1987	1,897	1,056	0.557	
1988	1,160	357	0.308	
1989	12,296	3,528	0.287	H
1990	335	225	0.672	
1991	1,217	729	0.599	
1992	489	554	1.133	
1993	3,375	1,375	0.407	
1994	679	507	0.747	
1995	2,977	903	0.303	
1996	1,166	582	0.499	
1997	2,964	1,343	0.453	
1998	22,401	4,732	0.211	
1999	8,773	2,388	0.272	H
2000	6,227	1,885	0.303	
2001	24,605	1,880	0.076	
2002	5,167	5,226	1.011	
2003	155,001	5,122	0.033	H
2004	5,167	1,471	0.285	
2005	154,981	20,235	0.131	H
2006	4,276	1,110	0.260	
2007	15,745	4,941	0.314	H
2008	2,583,017	346,615	0.134	H
2009	10,407	2,219	0.213	
2010	18,030	4,281	0.237	
2011	96,290	15,170	0.158	
2012	67,586	15,858	0.235	
2013	70,855	13,910	0.196	
2014	7,047	6,892	0.978	
2015	137,960	39,988	0.290	
2016	28,417	15,797	0.556	
2017	1,374,572	274,654	0.200	H
2018	13,184	6,424	0.487	
All Years Total	5,005,873	814,636	0.163	
Hurricane Years Total	4,467,176	668,433	0.150	
Non-Hurricane Years				
Total	538,697	146,203	0.271	
10 Year	454,052	121,649	0.268	

Notes:
(2) Exhibit 4, Sheet 2
(3) Exhibit 4, Sheet 4
(4) = (3) / (2)
(5) "H" indicates hurricane year

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Ultimate Loss (TWIA All Lines)

Accident Year	Incurred Loss at 12/31/18	Development Factor	Indicated Ultimate Loss
(1)	(2)	(3)	(4)
1980			12,911
1981			2,512
1982			796
1983			148,999
1984			999
1985			512
1986			881
1987			1,897
1988			1,160
1989			12,296
1990			335
1991			1,217
1992			489
1993			3,375
1994			679
1995			2,977
1996			1,166
1997			2,964
1998			22,401
1999			8,773
2000			6,227
2001			24,605
2002			5,167
2003			155,001
2004			5,167
2005			154,981
2006			4,276
2007			15,745
2008			2,583,017
2009			10,407
2010			18,030
2011	96,290	1.000	96,290
2012	67,586	1.000	67,586
2013	71,068	0.997	70,855
2014	7,068	0.997	7,047
2015	139,777	0.987	137,960
2016	28,908	0.983	28,417
2017	1,373,877	1.001	1,374,572
2018	13,197	0.999	13,184

Notes:

(2) Exhibit 4, Sheet 3

(3) Exhibit 4, Sheet 3

(4) 2011 - 2018: (2) * (3); 1980 - 2010: from prior TWIA annual statements

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Incurred Loss Development Factors
TWIA Schedule P Incurred Loss (Including IBNR)

Months of Development

Accident Year	12	24	36	48	60	72	84
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2009	8,267	10,825	10,581	10,732	10,453	10,404	10,407
2010	15,215	18,166	18,173	18,522	18,361	18,267	18,030
2011	94,870	96,967	97,503	96,828	96,263	95,964	96,290
2012	62,722	69,764	67,287	66,724	66,328	67,658	67,586
2013	77,204	75,204	72,860	71,823	71,286	71,068	
2014	6,739	7,854	7,298	7,261	7,068		
2015	147,927	139,955	140,459	139,777			
2016	31,292	29,612	28,908				
2017	1,278,467	1,373,877					
2018	13,197						

Development Factors

Accident Year	12 - 24	24 - 36	36 - 48	48 - 60	60 - 72	72 - 84	84 - Ult
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2009	1.309	0.977	1.014	0.974	0.995	1.000	
2010	1.194	1.000	1.019	0.991	0.995	0.987	
2011	1.022	1.006	0.993	0.994	0.997	1.003	
2012	1.112	0.964	0.992	0.994	1.020	0.999	
2013	0.974	0.969	0.986	0.993	0.997		
2014	1.165	0.929	0.995	0.973			
2015	0.946	1.004	0.995				
2016	0.946	0.976					
2017	1.075						
Average	1.083	0.978	0.999	0.987	1.001	0.997	
Avg x hi / lo	1.070	0.982	0.998	0.988	0.996	1.000	
Avg 3 Year	0.989	0.970	0.992	0.987	1.005	0.996	
Avg 5 Year	1.021	0.968	0.992	0.989	1.001	0.997	
Prior	1.054	0.984	1.003	1.005	0.993	0.993	1.000
Selected	1.041	0.977	0.996	0.990	1.000	0.997	1.000
Cumulative	0.999	0.960	0.983	0.987	0.997	0.997	1.000

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Ultimate LAE (TWIA All Lines)

Accident Year	Incurred ALAE at 12/31/18	Development Factor	Indicated Ultimate ALAE	Incurred ULAE	Incurred LAE
(1)	(2)	(3)	(4)	(5)	(6)
1980					1,318
1981					543
1982					565
1983					9,127
1984					324
1985					297
1986					505
1987					1,056
1988					357
1989			2,727	801	3,528
1990			119	106	225
1991			403	326	729
1992			270	284	554
1993			806	569	1,375
1994			192	315	507
1995			698	205	903
1996			355	227	582
1997			892	451	1,343
1998			3,920	812	4,732
1999			1,757	631	2,388
2000			1,209	676	1,885
2001			1,207	673	1,880
2002			3,643	1,583	5,226
2003			3,239	1,883	5,122
2004			844	627	1,471
2005			15,229	5,006	20,235
2006			860	250	1,110
2007			2,489	2,452	4,941
2008	99,668	1.000	99,668	246,947	346,615
2009	223	1.000	223	1,996	2,219
2010	323	1.000	323	3,958	4,281
2011	725	1.000	725	14,445	15,170
2012	896	1.000	896	14,962	15,858
2013	971	1.007	978	12,932	13,910
2014	1,077	1.008	1,086	5,806	6,892
2015	2,749	1.045	2,873	37,115	39,988
2016	746	1.203	897	14,900	15,797
2017	16,490	1.239	20,431	254,223	274,654
2018	301	1.425	429	5,995	6,424

Notes:

(2) Exhibit 4, Sheet 5
(3) Exhibit 4, Sheet 5
(4) 2008 - 2018: (2) * (3); 1986 - 2007: from TWIA's annual statements
(5) From TWIA's annual statements
(6) 1986 - 2018: (4) + (5); prior years from prior TWIA annual statements

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Incurred ALAE Development Factors
TWIA Schedule P Incurred ALAE (Including IBNR)

Months of Development

Accident Year	12	24	36	48	60	72	84
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2008	167,316	139,787	106,761	111,632	120,296	92,426	99,668
2009	7,335	359	226	231	223	223	223
2010	391	312	322	316	335	324	323
2011	515	592	609	682	629	745	725
2012	516	679	719	632	917	880	896
2013	802	806	715	1,089	991	971	
2014	516	493	1,085	1,266	1,077		
2015	973	1,818	2,355	2,749			
2016	412	678	746				
2017	891	16,490					
2018	301						

Development Factors

Accident Year	12 - 24	24 - 36	36 - 48	48 - 60	60 - 72	72 - 84	84 - Ult
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2008	0.835	0.764	1.046	1.078	0.768	1.078	
2009	0.049	0.630	1.022	0.965	1.000	1.000	
2010	0.798	1.032	0.981	1.060	0.967	0.997	
2011	1.150	1.029	1.120	0.922	1.184	0.973	
2012	1.316	1.059	0.879	1.451	0.960	1.018	
2013	1.005	0.887	1.523	0.910	0.980		
2014	0.955	2.201	1.167	0.851			
2015	1.868	1.295	1.167				
2016	1.646	1.100					
2017	18.507						
Average	2.813	1.111	1.113	1.034	0.977	1.013	
Avg x hi / lo	1.197	1.024	1.084	0.987	0.977	1.005	
Avg 3 Year	7.340	1.532	1.286	1.071	1.041	0.996	
Avg 5 Year	4.796	1.308	1.171	1.039	1.018	1.013	
Prior	1.150	1.030	1.100	1.055	0.993	1.025	1.000
Selected	1.150	1.030	1.151	1.037	1.001	1.007	1.000
Cumulative	1.425	1.239	1.203	1.045	1.008	1.007	1.000

Texas Windstorm Insurance Association Exhibit 5
Residential Property - Wind & Hail
Rate Level Review
Summary of Indicated Hurricane Loss & LAE Ratios

Basis for Hurricane Loss Ratio	Indicated Loss Ratio	LAE Factor	Indicated Loss & LAE Ratio
(1)	(2)	(3)	(4)
Industry Experience	36.7%	0.150	42.2%
Hurricane Models			
AIR Model	48.9%	0.150	56.2%
RMS Model	41.3%	0.150	47.5%
Average of Models	45.1%	0.150	51.9%

Notes:
(2) Exhibit 6 - Exhibit 8, Sheet 1
(3) Exhibit 4, Sheet 1
(4) = (2) * [1 + (3)]

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Industry Experience -- Residential Extended Coverage
1966 - 2018 -- Hurricane Years Only

Accident Year	Earned Premium at Current TWIA Rate Level	Incurred Loss Ratio
(1)	(2)	(3)
1968	33,975,804	32.9%
1970	34,658,928	60.0%
1971	34,539,514	65.8%
1980	58,664,250	74.8%
1983	75,333,571	420.6%
1986	95,974,159	9.5%
1989	109,248,693	7.0%
1990	105,685,439	16.8%
1999	185,055,377	8.4%
2003	219,135,228	21.0%
2005	244,968,041	114.2%
2007	367,465,453	5.3%
2008	459,720,537	417.7%
2017	559,347,767	224.2%

(4)	Simple Average Loss Ratio for Hurricane Years	105.6%	
(5)	Selected Non-Hurricane Loss Ratio	9.3%	
(6)	Average Hurricane Loss Ratio for Hurricane Years	96.3%	
(7)	Historical Hurricane Frequency		
	(a) 53-Year (1/1/1966 - 12/31/2018)	0.283	(1 Hurricane Every 3.5 years)
	(a) 168-Year (1/1/1851 - 12/31/2018)	0.381	(1 Hurricane Every 2.6 years)
	Selected Frequency	0.381	(1 Hurricane Every 2.6 years)
(8)	Indicated Hurricane Loss Ratio	36.7%	

Notes:
(2) Exhibit 6, Sheet 2. Accident years ending 9/30/xx
(3) Exhibit 6, Sheet 2. Accident years ending 9/30/xx
(4) = Average of (3)
(5) Exhibit 6, Sheet 2
(6) = (4) - (5)
(7) Exhibit 9
(8) = (6) * (7) Selected

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Industry Experience -- Residential Extended Coverage
1966 - 2018

Accident Year	Earned Premium	Earned Premium at CMR	Earned Premium at Current TWIA Rate Level	Incurred Losses	Incurred Loss Ratio	Hurricane Indicator
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1966		13,011,528	34,051,169	1,178,131	3.5%	
1967		13,130,860	34,363,461	663,024	1.9%	
1968		12,982,730	33,975,804	11,171,683	32.9%	H
1969		12,499,176	32,710,344	3,218,757	9.8%	
1970		13,243,763	34,658,928	20,786,468	60.0%	H
1971	10,640,335	13,198,133	34,539,514	22,731,206	65.8%	H
1972	12,302,040	13,902,740	36,383,471	2,242,093	6.2%	
1973	12,935,382	12,724,690	33,300,514	4,933,261	14.8%	
1974	12,794,652	11,637,700	30,455,861	2,293,219	7.5%	
1975	13,633,616	12,392,309	32,430,673	3,062,897	9.4%	
1976	17,088,846	13,884,831	36,336,603	1,522,489	4.2%	
1977	23,643,216	17,474,220	45,730,034	972,383	2.1%	
1978	28,157,329	19,320,941	50,562,903	1,449,823	2.9%	
1979	32,867,536	21,563,567	56,431,855	3,940,899	7.0%	
1980	32,179,994	22,416,603	58,664,250		74.8%	H
1981	30,817,037	29,693,419	77,707,678		3.2%	
1982	28,140,159	32,398,474	84,786,806		2.3%	
1983	28,786,234	39,817,626	75,333,571		420.6%	H
1984	20,078,668	34,626,400	52,545,874		12.4%	
1985	30,043,452	53,801,222	78,623,714		5.3%	
1986	36,673,352		95,974,159		9.5%	H
1987	41,598,709		108,863,822		2.4%	
1988	45,044,392		117,881,171		10.3%	
1989	41,745,774		109,248,693		7.0%	H
1990	40,384,195		105,685,439		16.8%	H
1991	46,237,137		121,002,587		70.9%	
1992	44,512,572		116,901,523		6.3%	
1993	50,741,120		131,102,375		10.5%	
1994	57,584,585		147,667,297		5.2%	
1995	60,740,049		155,822,209		7.2%	
1996	71,865,572		183,728,987		3.7%	
1997	79,154,547		207,521,219		4.3%	
1998	80,238,260		208,993,573		19.4%	
1999	71,026,552		185,055,377		8.4%	H
2000	75,114,174		179,255,336		5.5%	
2001	74,726,401		149,512,083		7.5%	
2002	86,289,350		170,408,569		17.3%	
2003	112,200,741		219,135,228		21.0%	H
2004	123,050,217		233,180,490		1.8%	
2005	135,380,924		244,968,041		114.2%	H
2006	154,699,767		279,039,773		2.1%	
2007	219,914,305		367,465,453		5.3%	H
2008	289,558,186		459,720,537		417.7%	H
2009	327,305,758		481,844,994		1.9%	
2010	355,219,215		492,693,663		3.9%	
2011	370,875,863		507,182,054		18.9%	
2012	406,981,851		527,628,803		14.0%	
2013	440,952,159		544,419,639		16.9%	
2014	477,983,216		560,428,049		2.3%	
2015	517,579,765		577,523,193		24.8%	
2016	541,982,800		578,834,797		8.8%	
2017	533,284,592		559,347,767		224.2%	H
2018	516,750,480		529,927,437		3.8%	
Total / Average	6,861,505,076	413,720,932	10,611,557,367		34.7%	
Average of Non-Hurricane Years					9.3%	
Selected					9.3%	

Notes: (2), (3) Provided by TDI. Accident years ending 9/30/xx as of 12/31/2018
(4) 1983 - 2018: Sum of Exhibit 6, Sheet 4 - Sheet 7, (4); 1966 - 1982: (3) * 2.6
(5) Provided by TDI. Accident years ending 9/30/xx as of 12/31/2010
(6) 1983 - 2018: Exhibit 6, Sheet 3; 1966 - 1981: (5) / (4)
(7) "H" indicates occurrence of hurricane(s) during the time period (years ending 9/30/xx)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Industry Experience -- Residential Extended Coverage

Loss Ratios by Territory / Tier

Accident Year	Territory 8	Territory 9	Territory 10	Tier 2	Weighted Loss Ratio	Wtd Devel'd Loss Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1983	1052.2%	6.2%	142.5%	145.2%	420.6%	420.6%
1984	3.2%	5.8%	20.8%	33.1%	12.4%	12.4%
1985	1.7%	7.1%	6.9%	11.1%	5.3%	5.3%
1986	1.0%	2.4%	18.2%	12.1%	9.5%	9.5%
1987	0.5%	3.5%	3.2%	6.3%	2.4%	2.4%
1988	4.9%	6.0%	15.8%	6.4%	10.3%	10.3%
1989	5.5%	5.7%	8.3%	15.3%	7.0%	7.0%
1990	28.9%	10.4%	10.6%	21.3%	16.8%	16.8%
1991	58.5%	12.9%	103.5%	15.4%	70.9%	70.9%
1992	1.2%	11.0%	7.7%	17.5%	6.3%	6.3%
1993	12.5%	12.8%	8.0%	21.4%	10.5%	10.5%
1994	2.3%	7.2%	6.4%	7.6%	5.2%	5.2%
1995	2.8%	10.4%	8.6%	22.5%	7.2%	7.2%
1996	1.3%	5.9%	4.4%	9.0%	3.7%	3.7%
1997	1.7%	3.9%	6.3%	7.7%	4.3%	4.3%
1998	17.6%	10.4%	24.4%	9.3%	19.4%	19.4%
1999	2.0%	16.6%	9.8%	9.8%	8.4%	8.4%
2000	0.9%	2.4%	9.7%	10.9%	5.5%	5.5%
2001	5.4%	8.2%	7.9%	35.6%	7.5%	7.5%
2002	24.4%	6.9%	16.5%	10.6%	17.3%	17.3%
2003	5.1%	10.8%	36.5%	10.3%	21.0%	21.0%
2004	1.3%	2.1%	1.9%	3.9%	1.8%	1.8%
2005	51.1%	3.1%	203.6%	37.2%	114.2%	114.2%
2006	1.0%	1.9%	2.8%	4.9%	2.1%	2.1%
2007	2.7%	2.4%	8.3%	4.9%	5.3%	5.3%
2008	694.6%	3.0%	382.2%	418.4%	417.7%	417.7%
2009	2.9%	1.0%	1.3%	9.4%	1.9%	1.9%
2010	1.2%	6.2%	4.8%	10.9%	3.9%	3.9%
2011	1.0%	28.1%	28.4%	6.0%	18.9%	18.9%
2012	8.3%	30.8%	9.5%	85.0%	14.0%	14.0%
2013	40.7%	9.7%	2.8%	19.6%	16.9%	16.9%
2014	0.5%	2.7%	3.1%	17.6%	2.3%	2.3%
2015	12.7%	13.4%	37.5%	35.2%	24.8%	24.8%
2016	8.3%	13.4%	6.4%	35.7%	8.7%	8.8%
2017	29.4%	323.6%	303.1%	58.4%	212.5%	224.2%
2018	2.2%	2.0%	4.1%	9.2%	3.2%	3.8%
Average	58.1%	16.9%	41.0%	33.2%	42.2%	42.6%

TWIA 2018 Written Premium by Territory / Tier

		Territory 8	Territory 9	Territory 10	Tier 2	Total
(8)	Amount	109,856,744	59,905,533	155,594,490	4,279,815	329,636,582
(9)	% Share	33.3%	18.2%	47.2%	1.3%	100.0%

Notes:

(2) Exhibit 6, Sheet 4
(3) Exhibit 6, Sheet 5
(4) Exhibit 6, Sheet 6
(5) Exhibit 6, Sheet 7
(6) = Weighted average of (2) to (5), using (9)
(7) = (6) * loss develepment factors from Exhibit 3.1b
(8) Provided by TWIA
(9) = (8) / (8) Total

Texas Windstorm Insurance Association Exhibit 6
Residential Property - Wind & Hail Sheet 4
Rate Level Review
Industry Experience -- Residential Extended Coverage
Tier 1 -- Territory 8 (Galveston County)

Accident Year	Earned Premium	Factor to TWIA Rate Level	Earned Premium at Current TWIA Rate Level	Incurred Loss	Incurred Loss Ratio	premium trend;loss trend
(1)	(2)	(3)	(4)	(5)	(6)	
1983	4,317,605	2.617	11,299,172	118,889,570	1052.2%	
1984	3,512,853	2.617	9,193,136	292,543	3.2%	
1985	6,066,870	2.617	15,876,999	265,705	1.7%	
1986	6,846,710	2.617	17,917,840	187,218	1.0%	
1987	7,738,740	2.617	20,252,283	111,242	0.5%	
1988	8,043,378	2.617	21,049,520	1,026,666	4.9%	
1989	8,149,957	2.617	21,328,437	1,163,813	5.5%	
1990	7,816,199	2.617	20,454,993	5,908,943	28.9%	
1991	8,645,208	2.617	22,624,509	13,225,287	58.5%	
1992	5,826,467	2.617	15,247,864	180,484	1.2%	
1993	5,825,916	2.617	15,246,422	1,900,088	12.5%	
1994	6,996,874	2.617	18,310,819	420,038	2.3%	
1995	8,737,576	2.617	22,866,236	644,169	2.8%	
1996	11,652,672	2.617	30,495,043	406,004	1.3%	
1997	12,573,252	2.617	32,904,200	573,343	1.7%	
1998	13,838,930	2.617	36,216,480	6,371,206	17.6%	
1999	14,103,814	2.593	36,572,405	742,130	2.0%	
2000	15,784,218	2.386	37,653,944	324,948	0.9%	
2001	17,776,666	2.013	35,786,511	1,947,817	5.4%	
2002	20,514,469	2.013	41,298,029	10,059,284	24.4%	
2003	25,868,450	2.013	52,076,220	2,672,918	5.1%	
2004	30,357,860	1.920	58,274,910	731,759	1.3%	
2005	36,780,457	1.837	67,557,818	34,527,644	51.1%	
2006	43,562,211	1.832	79,822,419	813,430	1.0%	
2007	59,282,257	1.749	103,685,428	2,757,645	2.7%	
2008	73,789,694	1.650	121,718,652	845,466,768	694.6%	
2009	81,999,709	1.499	122,893,429	3,581,024	2.9%	
2010	89,665,314	1.407	126,202,213	1,451,547	1.2%	
2011	93,230,854	1.373	127,979,548	1,329,886	1.0%	
2012	99,629,727	1.307	130,253,235	10,756,644	8.3%	
2013	107,104,250	1.245	133,375,327	54,316,145	40.7%	
2014	114,784,032	1.186	136,160,810	691,708	0.5%	
2015	122,782,019	1.130	138,739,529	17,655,480	12.7%	
2016	127,007,324	1.077	136,730,973	11,289,476	8.3%	
2017	126,002,753	1.050	132,302,891	38,944,566	29.4%	
2018	122,707,420	1.026	125,841,852	2,791,799	2.2%	
Total	1,549,322,705		2,276,210,096	1,194,418,937	52.5%	

Notes:
(2) Provided by TDI. Accident years ending 9/30/xx as of 12/31/2018
(3) 1998 and prior judgementally selected; 1999 - 2018 based on TWIA on-level factors
(4) = (2) * (3)
(5) Provided by TDI. Accidn't yrs ending 9/30/xx as of 12/31/2018; 2008 IKE incurred loss was adjusted down by $206,858,309 to incorporate the statutory limitations on litigation cost that House Bill 3 provides
(6) = (5) / (4)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Industry Experience -- Residential Extended Coverage
Tier 1 -- Territory 9 (Nueces County)

Accident Year	Earned Premium	Factor to TWIA Rate Level	Earned Premium at Current TWIA Rate Level	Incurred Loss	Incurred Loss Ratio
(1)	(2)	(3)	(4)	(5)	(6)
1983	2,331,938	2.617	6,102,682	377,010	6.2%
1984	1,632,317	2.617	4,271,774	249,086	5.8%
1985	2,505,564	2.617	6,557,061	467,721	7.1%
1986	2,977,992	2.617	7,793,405	189,449	2.4%
1987	3,639,667	2.617	9,525,009	335,212	3.5%
1988	3,971,251	2.617	10,392,764	626,491	6.0%
1989	3,702,536	2.617	9,689,537	550,215	5.7%
1990	3,519,306	2.617	9,210,024	955,271	10.4%
1991	4,065,190	2.617	10,638,602	1,367,254	12.9%
1992	4,065,190	2.617	10,638,602	1,170,578	11.0%
1993	3,907,712	2.617	10,226,482	1,312,776	12.8%
1994	4,552,395	2.617	11,913,618	856,369	7.2%
1995	5,710,806	2.617	14,945,179	1,552,987	10.4%
1996	6,908,552	2.617	18,079,681	1,061,115	5.9%
1997	8,568,168	2.617	22,422,896	882,561	3.9%
1998	8,425,344	2.617	22,049,125	2,289,890	10.4%
1999	8,803,621	2.593	22,828,548	3,778,386	16.6%
2000	8,465,256	2.386	20,194,239	485,581	2.4%
2001	8,437,094	2.013	16,984,859	1,394,445	8.2%
2002	8,894,552	2.013	17,905,775	1,227,528	6.9%
2003	10,534,795	2.013	21,207,776	2,295,803	10.8%
2004	13,881,847	1.920	26,647,576	569,877	2.1%
2005	15,458,506	1.837	28,393,963	872,451	3.1%
2006	17,471,646	1.832	32,014,652	621,501	1.9%
2007	19,888,512	1.749	34,785,263	833,793	2.4%
2008	29,704,042	1.650	48,997,844	1,468,028	3.0%
2009	40,565,108	1.499	60,795,157	615,469	1.0%
2010	46,363,445	1.407	65,255,661	4,059,049	6.2%
2011	51,529,115	1.373	70,734,875	19,843,778	28.1%
2012	52,931,755	1.307	69,201,558	21,286,940	30.8%
2013	56,334,273	1.245	70,152,231	6,825,640	9.7%
2014	60,101,696	1.186	71,294,722	1,913,725	2.7%
2015	65,642,137	1.130	74,173,395	9,932,478	13.4%
2016	72,124,134	1.077	77,645,940	10,418,298	13.4%
2017	76,436,084	1.050	80,257,888	259,698,732	323.6%
2018	77,008,517	1.026	78,975,618	1,542,253	2.0%
Total	811,060,063		1,172,903,981	363,927,740	31.0%

Notes:

(2) Provided by TDI. Accident years ending 9/30/xx as of 12/31/2018
(3) 1998 and prior judgementally selected; 1999 - 2018 based on TWIA on-level factors
(4) = (2) * (3)
(5) Provided by TDI. Accidn't yrs ending 9/30/xx as of 12/31/2018
(6) = (5) / (4)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Industry Experience -- Residential Extended Coverage
Tier 1 -- Territory 10 (Other Tier 1)

Accident Year	Earned Premium	Factor to TWIA Rate Level	Earned Premium at Current TWIA Rate Level	Incurred Loss	Incurred Loss Ratio
(1)	(2)	(3)	(4)	(5)	(6)
1983	5,888,781	2.617	15,410,940	21,953,626	142.5%
1984	3,924,651	2.617	10,270,812	2,135,063	20.8%
1985	5,808,825	2.617	15,201,695	1,055,065	6.9%
1986	6,993,722	2.617	18,302,570	3,338,312	18.2%
1987	7,677,374	2.617	20,091,688	634,637	3.2%
1988	8,284,768	2.617	21,681,238	3,434,130	15.8%
1989	7,733,295	2.617	20,238,033	1,670,422	8.3%
1990	7,568,146	2.617	19,805,838	2,095,151	10.6%
1991	8,287,605	2.617	21,688,662	22,444,044	103.5%
1992	8,059,407	2.617	21,091,468	1,625,108	7.7%
1993	8,448,603	2.617	22,109,994	1,776,572	8.0%
1994	9,743,293	2.617	25,498,198	1,637,915	6.4%
1995	10,745,995	2.617	28,122,269	2,416,675	8.6%
1996	13,294,968	2.617	34,792,931	1,520,229	4.4%
1997	15,708,220	2.617	41,108,412	2,569,544	6.3%
1998	16,168,136	2.617	42,312,012	10,312,506	24.4%
1999	14,452,667	2.593	37,477,010	3,655,754	9.8%
2000	14,453,385	2.386	34,479,183	3,332,580	9.7%
2001	15,173,521	2.013	30,546,075	2,426,814	7.9%
2002	17,843,905	2.013	35,921,871	5,925,066	16.5%
2003	23,423,208	2.013	47,153,662	17,213,668	36.5%
2004	27,306,202	1.920	52,416,951	990,613	1.9%
2005	31,012,304	1.837	56,962,957	115,989,785	203.6%
2006	36,545,725	1.832	66,965,567	1,842,548	2.8%
2007	69,945,120	1.749	122,334,912	10,105,722	8.3%
2008	110,187,567	1.650	181,758,202	694,640,836	382.2%
2009	128,275,387	1.499	192,247,050	2,522,159	1.3%
2010	143,236,007	1.407	201,601,937	9,656,553	4.8%
2011	151,387,931	1.373	207,812,737	59,069,922	28.4%
2012	170,159,709	1.307	222,462,243	21,172,040	9.5%
2013	183,495,510	1.245	228,504,225	6,488,552	2.8%
2014	197,640,983	1.186	234,448,607	7,195,229	3.1%
2015	212,320,998	1.130	239,915,547	89,893,014	37.5%
2016	218,795,204	1.077	235,546,111	14,998,519	6.4%
2017	212,533,686	1.050	223,160,370	676,342,414	303.1%
2018	201,512,669	1.026	206,660,098	8,373,757	4.1%
Total	2,324,037,477		3,236,102,077	1,832,454,544	56.6%

Notes:
(2) Provided by TDI. Accident years ending 9/30/xx as of 12/31/2018
(3) 1998 and prior judgementally selected; 1999 - 2016 based on TWIA on-level factors
(4) = (2) * (3)
(5) Provided by TDI. Accidn't yrs ending 9/30/xx as of 12/31/2018
(6) = (5) / (4)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Industry Experience -- Residential Extended Coverage
Tier 2 -- (Territories 1 and 11)

Accident Year	Earned Premium	Factor to TWIA Rate Level	Earned Premium at Current TWIA Rate Level	Incurred Loss	Incurred Loss Ratio
(1)	(2)	(3)	(4)	(5)	(6)
1983	16,247,909	2.617	42,520,778	61,752,490	145.2%
1984	11,008,847	2.617	28,810,153	9,535,536	33.1%
1985	15,662,193	2.617	40,987,959	4,532,749	11.1%
1986	19,854,927	2.617	51,960,344	6,306,903	12.1%
1987	22,542,928	2.617	58,994,843	3,739,010	6.3%
1988	24,744,994	2.617	64,757,649	4,139,098	6.4%
1989	22,159,987	2.617	57,992,686	8,884,751	15.3%
1990	21,480,544	2.617	56,214,584	11,997,188	21.3%
1991	25,239,134	2.617	66,050,814	10,178,608	15.4%
1992	26,718,987	2.617	69,923,589	12,221,034	17.5%
1993	31,914,206	2.617	83,519,477	17,910,197	21.4%
1994	35,133,612	2.617	91,944,663	6,968,697	7.6%
1995	34,347,927	2.617	89,888,525	20,240,594	22.5%
1996	38,349,764	2.617	100,361,332	9,046,495	9.0%
1997	42,447,731	2.617	111,085,712	8,514,675	7.7%
1998	41,427,572	2.617	108,415,956	10,127,907	9.3%
1999	34,004,815	2.593	88,177,414	8,680,187	9.8%
2000	36,439,477	2.386	86,927,969	9,518,422	10.9%
2001	32,881,662	2.013	66,194,638	23,547,404	35.6%
2002	37,396,181	2.013	75,282,893	7,950,367	10.6%
2003	49,027,236	2.013	98,697,570	10,177,909	10.3%
2004	49,927,649	1.920	95,841,052	3,738,542	3.9%
2005	50,116,517	1.837	92,053,303	34,201,898	37.2%
2006	54,703,319	1.832	100,237,135	4,909,932	4.9%
2007	60,982,886	1.749	106,659,850	5,242,698	4.9%
2008	65,015,817	1.650	107,245,838	448,708,416	418.4%
2009	70,667,217	1.499	105,909,359	9,952,501	9.4%
2010	70,788,779	1.407	99,633,851	10,826,541	10.9%
2011	73,325,323	1.373	100,654,894	5,992,356	6.0%
2012	80,858,142	1.307	105,711,768	89,876,917	85.0%
2013	90,250,703	1.245	112,387,856	22,049,904	19.6%
2014	99,916,064	1.186	118,523,910	20,906,458	17.6%
2015	110,352,614	1.130	124,694,722	43,880,545	35.2%
2016	119,744,188	1.077	128,911,773	46,061,809	35.7%
2017	117,739,636	1.050	123,626,618	72,170,328	58.4%
2018	115,499,554	1.026	118,449,869	10,839,197	9.2%
Total	1,615,679,851		2,937,174,858	1,012,318,738	34.5%

Notes:
(2) Provided by TDI. Accident years ending 9/30/xx as of 12/31/2018
(3) 1998 and prior judgementally selected; 1999 - 2018 based on TWIA on-level factors
(4) = (2) * (3)
(5) Provided by TDI. Accidn't yrs ending 9/30/xx as of 12/31/2018
(6) = (5) / (4)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Hurricane Loss Ratio -- AIR Model

County	TWIA Insured Values (000s) as of 11/30/18	Modeled Loss Cost	Expected Annual Hurricane Loss
(1)	(2)	(3)	(4)
Aransas	1,598,461	2.711	4,333,428
Brazoria	10,497,828	1.746	18,329,208
Calhoun	884,696	3.225	2,853,145
Cameron	2,423,053	1.753	4,247,612
Chambers	1,499,444	1.722	2,582,043
Galveston	18,651,386	4.189	78,130,656
Harris	1,080,645	4.358	4,709,451
Jefferson	6,663,167	2.076	13,832,735
Kenedy	5,620	1.084	6,092
Kleberg	199,255	0.997	198,657
Matagorda	1,141,967	2.848	3,252,322
Nueces	10,586,224	2.627	27,810,010
Refugio	78,703	1.619	127,420
San Patricio	1,774,969	2.013	3,573,013
Willacy	82,347	2.126	175,070
Total	57,167,765	2.958	164,160,862
(5) Inforce-Premium as of Nov 30, 2018 at Present Rates			335,447,380
(6) Indicated Hurricane Loss Ratio			48.9%

Notes:
(2) Provided by TWIA
(3) Exhibit 7, Sheet 2
(4) = (2) * (3)
(5) Provided by TWIA
(6) = (4) Total / (5)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
AIR Simulated Hurricane Results

County	TWIA Insured Values (000s) as of 11/30/18	Average Annual Modeled Loss	Provision for Storm Surge	Modeled Loss Cost
(1)	(2)	(3)	(4)	(5)
Aransas	1,598,461	4,316,766	1.004	2.711
Brazoria	10,497,828	18,253,087	1.004	1.746
Calhoun	884,696	2,841,463	1.004	3.225
Cameron	2,423,053	4,230,069	1.004	1.753
Chambers	1,499,444	2,572,488	1.004	1.722
Galveston	18,651,386	77,821,106	1.004	4.189
Harris	1,080,645	4,691,123	1.004	4.358
Jefferson	6,663,167	13,776,645	1.004	2.076
Kenedy	5,620	6,067	1.004	1.084
Kleberg	199,255	197,916	1.004	0.997
Matagorda	1,141,967	3,239,774	1.004	2.848
Nueces	10,586,224	27,703,630	1.004	2.627
Refugio	78,703	126,893	1.004	1.619
San Patricio	1,774,969	3,559,410	1.004	2.013
Willacy	82,347	174,336	1.004	2.126
Total	57,167,765	163,510,773	1.004	2.872

Notes:
(2) Provided by TWIA and Geo-coded by AIR
(3) Provided by AIR
(4) = 10% of modeled storm surge increase, estimated to be 4.0%
(5) = (3) / (2) * (4)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Hurricane Loss Ratio -- RMS Model

County	TWIA Insured Values (000s) as of 11/30/18	Modeled Loss Cost	Expected Annual Hurricane Loss
(1)	(2)	(3)	(4)
Aransas	1,598,461	2.435	3,892,253
Brazoria	10,497,828	1.721	18,066,762
Calhoun	884,696	3.717	3,288,415
Cameron	2,423,053	2.027	4,911,528
Chambers	1,499,444	1.679	2,517,566
Galveston	18,651,386	3.209	59,852,298
Harris	1,080,645	2.935	3,171,693
Jefferson	6,663,167	1.949	12,986,512
Kenedy	5,620	2.418	13,589
Kleberg	199,255	1.516	302,071
Matagorda	1,141,967	2.918	3,332,260
Nueces	10,586,224	2.095	22,178,139
Refugio	78,703	2.367	186,290
San Patricio	1,774,969	1.983	3,519,764
Willacy	82,347	2.888	237,818
Total	57,167,765	2.422	138,456,958
(5) Inforce-Premium as of Nov 30, 2018 at Present Rates			335,447,380
(6) Indicated Hurricane Loss Ratio			41.3%

Notes:
(2) Provided by TWIA
(3) Exhibit 8, Sheet 2
(4) = (2) * (3)
(5) Provided by TWIA
(6) = (4) Total / (5)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
RMS Simulated Hurricane Results

County	TWIA Insured Values (000s) as of 11/30/18	Average Annual Modeled Loss	Provision for Storm Surge	Modeled Loss Cost
(1)	(2)	(3)	(4)	(5)
Aransas	1,598,461	3,824,085	1.018	2.435
Brazoria	10,497,828	17,743,716	1.018	1.721
Calhoun	884,696	3,230,254	1.018	3.717
Cameron	2,423,053	4,824,412	1.018	2.027
Chambers	1,499,444	2,473,031	1.018	1.679
Galveston	18,651,386	58,801,343	1.018	3.209
Harris	1,080,645	3,115,175	1.018	2.935
Jefferson	6,663,167	12,754,371	1.018	1.949
Kenedy	5,620	13,349	1.018	2.418
Kleberg	199,255	296,734	1.018	1.516
Matagorda	1,141,967	3,273,653	1.018	2.918
Nueces	10,586,224	21,785,951	1.018	2.095
Refugio	78,703	182,984	1.018	2.367
San Patricio	1,774,969	3,457,820	1.018	1.983
Willacy	82,347	233,584	1.018	2.888
Total	57,167,765	136,010,462	1.018	2.422

Notes:
(2) Provided by TWIA and Geo-coded by RMS
(3) Provided by RMS
(4) = 10% of modeled storm surge increase, estimated to be 18.0%
(5) = (3) / (2) * (4)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Texas Hurricanes 1850 - 2018

Exhibit 9

Landfall Year	Month	Name
	(1)	(2)
1851	Jun	
1854	Jun	
1854	Sep	"Matagorda"
1865	Sep	"Sabine River-Lake Calcasieu"
1866	Jul	
1867	Oct	"Galveston"
1869	Aug	"Lower Texas Coast"
1875	Sep	
1879	Aug	
1880	Aug	
1882	Sep	
1886	Jun	
1886	Aug	"Indianola"
1886	Sep	
1886	Oct	
1887	Sep	
1888	Jun	
1891	Jul	
1895	Aug	
1897	Sep	
1900	Sep	"Galveston"
1909	Jun	
1909	Jul	"Velasco"
1909	Aug	
1910	Sep	
1912	Oct	
1913	Jun	
1915	Aug	"Galveston"
1916	Aug	
1919	Sep	
1921	Jun	
1929	Jun	
1932	Aug	"Freeport"
1933	Aug	
1933	Sep	
1934	Jul	
1936	Jun	
1940	Aug	
1941	Sep	
1942	Aug	
1942	Aug	
1943	Jul	
1945	Aug	
1947	Aug	
1949	Oct	
1957	Jun	Audrey
1959	Jul	Debra
1961	Sep	Carla
1963	Sep	Cindy
1967	Sep	Beulah
1970	Aug	Celia
1971	Sep	Fern
1980	Aug	Allen
1983	Aug	Alicia
1986	Jun	Bonnie
1989	Aug	Chantal
1989	Oct	Jerry
1999	Aug	Bret
2003	Jul	Claudette
2005	Sep	Rita
2007	Sep	Humberto
2008	Jul	Dolly
2008	Sep	Ike
2017	Aug	Harvey

Frequency	Date Period	Hurricanes	Period	Annual Frequency
53-Year	1/1/1966 - 12/31/2018	15	53	0.283
168-Year	1/1/1851 - 12/31/2018	64	168	0.381

Notes:
(1), (2) from NOAA Technical Memorandum NWS TPC-5, updated with actual experience through 2018

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Calculation of TWIA Earned Premium at Present Rate Level
Tier 1 -- Territory 8 (Galveston County)

Year	TWIA Earned Premium	Factor to Current Rate Level	Earned Premium at Current Rate Level
(1)	(2)	(3)	(4)
2009	80,844,468	1.499	121,162,062
2010	88,599,807	1.407	124,702,532
2011	92,287,441	1.373	126,684,509
2012	98,605,959	1.307	128,914,788
2013	105,941,027	1.245	131,926,783
2014	113,521,698	1.186	134,663,386
2015	121,221,015	1.130	136,975,647
2016	123,942,872	1.077	133,431,908
2017	120,650,271	1.050	126,682,785
2018	112,717,188	1.026	115,596,430
Total	1,058,331,746		1,280,740,830

Notes:
(2) Provided by TWIA
(3) Provided by TWIA
(4) = (2) * (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Calculation of TWIA Earned Premium at Present Rate Level
Tier 1 -- Territory 9 (Nueces County)

Year	TWIA Earned Premium	Factor to Current Rate Level	Earned Premium at Current Rate Level
(1)	(2)	(3)	(4)
2009	43,977,111	1.499	65,908,745
2010	49,048,919	1.407	69,035,414
2011	50,547,302	1.373	69,387,124
2012	53,841,760	1.307	70,391,274
2013	57,427,564	1.245	71,513,690
2014	62,828,148	1.186	74,528,934
2015	68,716,114	1.130	77,646,885
2016	71,234,774	1.077	76,688,491
2017	69,126,281	1.050	72,582,595
2018	63,899,693	1.026	65,531,943
Total	590,647,666		713,215,095

Notes:
(2) Provided by TWIA
(3) Provided by TWIA
(4) = (2) * (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Calculation of TWIA Earned Premium at Present Rate Level
Tier 1 -- Territory 10 (Other Tier 1)

Year	TWIA Earned Premium	Factor to Current Rate Level	Earned Premium at Current Rate Level
(1)	(2)	(3)	(4)
2009	116,551,972	1.499	174,677,101
2010	131,679,293	1.407	185,336,084
2011	140,621,661	1.373	193,033,699
2012	160,031,435	1.307	209,220,809
2013	173,209,952	1.245	215,695,773
2014	187,152,484	1.186	222,006,785
2015	200,595,693	1.130	226,666,349
2016	200,978,477	1.077	216,365,340
2017	188,554,673	1.050	197,982,407
2018	166,829,909	1.026	171,091,403
Total	1,666,205,549		2,012,075,750

Notes:
(2) Provided by TWIA
(3) Provided by TWIA
(4) = (2) * (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Calculation of TWIA Earned Premium at Present Rate Level
Tier 2 -- (Territories 1 and 11)

Year	TWIA Earned Premium	Factor to Current Rate Level	Earned Premium at Current Rate Level
(1)	(2)	(3)	(4)
2009	2,218,368	1.499	3,324,681
2010	2,562,327	1.407	3,606,426
2011	2,825,372	1.373	3,878,435
2012	3,294,072	1.307	4,306,581
2013	3,672,814	1.245	4,573,701
2014	3,920,276	1.186	4,650,368
2015	4,202,726	1.130	4,748,938
2016	4,436,708	1.077	4,776,381
2017	4,435,808	1.050	4,657,598
2018	4,301,050	1.026	4,410,916
Total	35,869,521		42,934,025

Notes:
(2) Provided by TWIA
(3) Provided by TWIA
(4) = (2) * (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Calculation of TWIA Earned Premium at Present Rate Level

Year	Earned Premium at Manual Rates	Factor to Current Rate Level	Earned Premium at Current Rate Level
(1)	(2)	(3)	(4)
2008	219,412,771	1.650	361,928,954
2009	250,693,788	1.499	375,716,200
2010	273,154,916	1.407	384,460,314
2011	292,239,327	1.373	401,161,797
2012	323,323,869	1.307	422,704,960
2013	346,955,938	1.245	432,059,062
2014	372,022,089	1.186	441,305,539
2015	403,803,905	1.130	456,284,757
2016	405,934,590	1.077	437,012,842
2017	376,421,384	1.050	395,242,454
2018	341,468,875	1.026	350,191,338
Total	3,605,431,452		4,458,068,216

Notes:
(2) Provided by TWIA
(3) Based on historical rate changes
(4) = (2) * (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Fixed Expenses and Variable Permissible Loss & LAE Ratios

	Expense Category	2016	2017	2018	Selected
(1)	Direct Written Premium	$487,353,537	$423,074,138	$395,551,679	
(2)	Direct Earned Premium	496,456,941	451,347,130	409,954,258	
(3)	Commission				
	$ Amount	77,986,786	67,661,211	63,280,811	
	% of DWP	16.0%	16.0%	16.0%	16.0%
(4)	Other Acquisition				
	$ Amount	$0	$0	$0	
	% of DWP	0.0%	0.0%	0.0%	0.0%
(5)	General Expense				
	Unadjusted $ Amount	$26,421,698	$26,359,831	$30,687,177	
	Adjustments				
	Contribution to Statutory Fund	0	0	0	
	Adjusted $ Amount	26,421,698	26,359,831	30,687,177	
	% of DWP	5.4%	6.2%	7.8%	6.2%
(6)	Taxes, Licenses & Fees				
	$ Amount	$9,626,596	$8,281,293	$7,590,295	
	% of DWP	2.0%	2.0%	1.9%	2.0%
(7)	Reinsurance Expense				16.6%
(8)	Outstanding Class 1 Public Security Repayment				25.1%
(9)	Total Fixed Expenses				47.9%
(10)	Total Variable Expenses				18.0%
(11)	CRTF Contribution & UW Contingency & Uncertainty				5.0%
(12)	Permissible Loss & LAE Ratio				77.0%

Notes:
(1) - (6) From TWIA's Statutory Annual Statements and Insurance Expense Exhibits
(7) Exhibit 11, Sheet 2
(8) Outstanding Class 1 Public Security issued in 2014, Security depleted due to Hurricane Harvey;
0.251= Annual principal and interest payment $80.3M/Prospective written premium at present rate$320.396M
$320.396M = TWIA 2018 written premium $395,551,679*(1-10%)^2; 10% from Exhibit 11, sheet 2, (3)
(9) = (5) + (7) + (8)
(10) = (3) + (4) + (6)
(11) CRTF contribution selected judgmentally; Class 1 repayment based on projected $80 million in debt service
(12) = 100% - (10) - (11)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Development of Reinsurer Expense
Using Average of AIR and RMS Hurricane Models

(1)	2019 - 2020 Reinsurance Premium	87,905,608
(2a)	Average Annual Loss by Reinsurance Layer (AIR)	
	100% of $2100M XS $2100M	34,645,345
	Total	34,645,345
(2b)	Average Annual Loss by Reinsurance Layer (RMS)	
	100% of $2100M XS $2100M	19,178,101
	Total	19,178,101
(2c)	Selected Total Average Annual Loss	26,911,723
(3)	Annual Exposure Growth	-10.0%
(4)	Prospective Average Annual Loss	24,220,551
(5)	Net Cost of Reinsurance	60,051,975
(6)	TWIA 2018 Earned Premium at Present Rates	420,183,022
(7)	2019 - 2020 TWIA Prospective Earned Premium at Present Rates	361,909,628
(8)	Indicated Reinsurance Expense %	16.6%

Notes:
(1) From TWIA reinsurance contract effective 6/1/2019 through 5/31/2020
(2a) Provided by Guy Carpenter, based on AIR model using TWIA exposures as of 11/30/2018 and adjusted for ALAE
(2b) Provided by Guy Carpenter, based on RMS model using TWIA exposures as of 11/30/2018 and adjusted for ALAE
(2c) Selected equal to the average of the modeled average annual losses
(3) Selected based on projections communicated to reinsurers
(4) = (2c) * [(1+ (3)) ^ 1.000](projected exposure growth from 11/30/2018 to 12/1/2019)
(5) = (1) - (4)*1.15,1.15 is the loading for loss adjustment factor
(6) = Commercial Exhibit 10, Sheet 1 + Residential Exhibit 10, Sheet 2, calendar year ending 12/31/xx
(7) = (6) adjusted for exposure growth trend * [(1+ (3)) ^ 1.417] (projected exposure growth from 7/1/2018 to 12/1/2019)
(8) = (5) / (7)

Texas Windstorm Insurance Association Exhibit 12
Residential Property - Wind & Hail
Rate Level Review
Reconciliation of Premium Data to Annual Statement

Calendar Year	TWIA Provided Written Premium Commercial	Residential	Total	Annual Statement Gross Written Premium	Difference
(1)	(2)	(3)	(4)	(5)	(6)
1994	10,672,677	15,758,330	26,431,007	26,510,501	(79,494)
1995	12,865,905	19,259,265	32,125,170	32,419,287	(294,117)
1996	15,640,660	24,504,127	40,144,787	40,358,575	(213,788)
1997	16,536,186	25,783,455	42,319,641	42,462,844	(143,203)
1998	16,558,977	27,833,800	44,392,777	44,410,914	(18,137)
1999	17,394,142	27,168,992	44,563,134	44,581,218	(18,084)
2000	17,332,561	29,762,296	47,094,857	48,012,426	(917,569)
2001	17,544,251	36,220,623	53,764,874	54,630,727	(865,853)
2002	24,013,525	48,856,422	72,869,947	72,967,831	(97,884)
2003	29,220,514	58,573,191	87,793,705	87,987,279	(193,574)
2004	31,009,323	71,292,702	102,302,025	102,384,351	(82,326)
2005	35,740,174	78,094,458	113,834,632	113,927,701	(93,069)
2006	76,847,840	119,658,576	196,506,416	196,833,235	(326,819)
2007	110,951,718	203,561,196	314,512,914	315,139,307	(626,393)
2008	98,036,118	232,925,990	330,962,108	331,057,645	(95,537)
2009	111,269,573	269,535,059	380,804,632	382,342,402	(1,537,770)
2010	102,174,680	278,116,922	380,291,602	385,549,582	(5,257,980)
2011	100,017,021	307,494,236	407,511,257	403,748,164	3,763,093
2012	110,524,397	335,795,725	446,320,122	443,479,701	2,840,421
2013	112,904,624	360,838,081	473,742,705	472,739,474	1,003,231
2014	104,642,688	389,333,918	493,976,606	494,036,010	(59,404)
2015	98,715,934	407,969,846	506,685,780	503,824,316	2,861,464
2016	88,278,690	399,074,847	487,353,537	487,353,537	-
2017	70,749,081	352,368,052	423,117,133	423,074,138	42,995
2018	65,696,833	331,676,957	397,373,790	395,551,679	1,822,111
Total	1,495,338,091	4,451,457,066	5,946,795,157	5,945,382,844	1,412,313

Notes:
(2), (3) Provided by TWIA, as of 1/0/1900
(4) = (2) + (3)
(5) Based on TWIA Annual Statements
(6) = (4) - (5)