

**TEXAS WINDSTORM INSURANCE ASSOCIATION
RESIDENTIAL PROPERTY RATE LEVEL REVIEW
2018**

July 2018

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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 and results of this analysis.

DISTRIBUTION AND USE

This report was prepared for internal use by the management 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. This report may also be provided to the TWIA actuarial committee. 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 prepared by Applied Insurance Research (AIR) and one model prepared by Risk Management Solutions (RMS). Both models utilized TWIA exposure data as of 11/30/2017. 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 management decision.

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 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	+33%
Actual Industry Experience	+26%
Hurricane Simulation Models	+39%

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 use a long-term approach 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 52 years of actual insurance industry premiums and losses and 167 years of actual hurricane experience. This method possesses the advantage of finding broader regulatory acceptance in many states (including Texas). 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 2% more than the corresponding indication from the prior TWIA residential rate study. Addition of 2017 accident year experience (Harvey) and change 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 5% of TWIA premium. The CRTF was completely depleted for paying losses associated with 2017 Hurricane Harvey.

The Pre-event Class 1 securities provision 18.6% is necessary to repay debt service for outstanding debt issued in 2014. As of June 30, 2018, the Pre-event Class 1 securities were used in its entirety to pay claims associated with Hurricanes Harvey.

The provision for reinsurance expense is 16% 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 0.146 is equal to the weighted average of the 10 hurricane years included in the analysis. For non-hurricane losses, the indicated ratio of 0.261 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 2008 - 2017 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

12/31/17, 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 may be more preferable than an average excluding 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 to 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. Because the selected trends are estimates of the future trend between the current and prospective earned and accident dates, and because they are not used to trend historical experience to current premium and loss levels, it may not be necessary to use experience only from periods where both premium and loss data are available.

The resulting loss and LAE ratios for each accident year from 2008 - 2017 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 2008 - 2017 accident period. This method gives greater weight to more recent years due to TWIA's growth. Given the greater credibility normally associated with more recent experience and the potentially significant change in TWIA's residential book of business due to the growth, this weighting may be more appropriate than a non-weighted average across all years.

The all-territory indicated loss and LAE ratio is then calculated as the weighted average of the territory loss and LAE ratios. TWIA 2017 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 52 and 167 years, respectively. The other method is based on hurricane simulation models. The “52/167-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 52-year period is insufficient to measure long-term hurricane intensity.
- A 52-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 52/167-Year Industry Hurricane Experience

In Exhibit 6, Texas insurance industry seacoast dwelling extended coverage experience for the 1966 - 2017 period 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 - 2017), 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 52 years of loss ratios by separating the 52 years into the 14 hurricane years and 38 non-hurricane years. The 38 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: 94.6%.

The 52-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 52-year period is 0.288, while the annual frequency during the most recent 167-year period is 0.383. The 52-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 52-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 167-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 36.2%.

Hurricane Simulation Models

This projected hurricane loss ratio is determined based on the average result of two different hurricane simulation models. The models are AIR Touchstone v5 and RMS RiskLink v17. Both models were run using exposure data provided by TWIA as of 11/30/2017. 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 4,751 and 9,775 unique events, respectively, with the following distribution of intensity ratings:

Saffir-Simpson Category	AIR	RMS
Category 0	15.3%	48.1%
Category 1	35.3%	14.3%
Category 2	22.2%	12.5%
Category 3	18.4%	14.2%
Category 4	8.0%	9.7%
Category 5	0.8%	1.2%

The intensity at first landfall is shown for AIR and RMS events. The total frequency for events of each intensity is shown with the intensity most relevant to Texas exposures. Events shown as Category 0 include events with no us landfall, Cat 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 54.9% and 46.5%. The average of these loss ratios is 50.8%.

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, pre-event class 1 public security repayment and the net cost of reinsurance. The sum of these projected expenses provides for a 40.3% fixed expense ratio. Variable expenses include commission, taxes, and catastrophe trust fund contribution. 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 catastrophe reserve trust fund, repayment of Class 1 public securities, and the projected net cost of TWIA's purchasing of reinsurance. The 16% 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 4% more than the comparable indication based on the prior (July 2016) 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
<i>Previous Rate Indication (Combined Method)</i>		+30%
Change in modeled loss ratio	+2%	
2017 rate increase	-6%	
Addition of 2017 AY experience (Harvey)	+2.5%	
Change due to all other factors	+4.5%	
<i>Current Rate Indication (Combined Method)</i>		+33%

These reasons are discussed below:

Change in modeled loss ratio

TWIA compares expected annual hurricane loss to in-force premium as of Nov 30, 2017 at present rates for the modeled loss ratio provision. In the previous rate analysis, TWIA compared expected annual hurricane loss to 2016 earned premium at present rates for the modeled loss ratio provision. Since the expected annual hurricane loss was modeled on TWIA policies in-force as of Nov 30, 2017 and TWIA policies decreases by about 9% annually, this change represents improved accuracy compared to previous rate analysis. The change has a 1% impact (increase) on indicated rates. Impact due to model changes is less than 1%.

Change in reinsurance provision

The indicated rate change decreases approximately 2% as a result of decreases in reinsurance provision (16% reinsurance provision vs previous 17%). There are several moving pieces in TWIA 2018-2019 reinsurance program such as recent decrease in exposure, including exposure decrease due to Depop, changes in reinsurance coverage layer, drop down of the attachment point, reinsurance rate on line, pre-paid second season coverage layer. The overall net impact of the above listed driving factors on rates is -1%.

Change in Experience Period - Addition of 2017 AY experience (Harvey)

The indicated rate change increases approximately 2.5% as a result of the inclusion of actual experience from 2017. 2017 industry incurred loss ratio is about 213.5% for residential extended coverage. 2017 incurred loss ratio represents the third worst incurred loss ratio in Texas history, the worst incurred loss ratio is 414.1% mainly due to IKE in 2008.

SUMMARY OF EXHIBITS

<u>Exhibit Number</u>	<u>Exhibit Title or Purpose</u>
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 – 52/167-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
Rate Level Review
Summary of Indicated Rate Change
By Method for Projecting Hurricane Loss & LAE

Exhibit 1

Hurricane Projection Method	Indicated Loss & LAE Ratio				Permissible LLAE Ratio	Indicated Rate Change	Proposed Rate Change
	Hurricane	Non-Hurricane	Fixed Expenses	Total			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Using Experience and Models	46.2%	15.6%	40.3%	102.1%	77.0%	+33%	+5.0%
Using Actual Industry Experience	41.5%	15.6%	40.3%	97.4%	77.0%	+26%	
Using Hurricane Models	50.8%	15.6%	40.3%	106.7%	77.0%	+39%	

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

Territory	2017 Written Premium		Indicated Non-Hurricane Loss & LAE Ratio
	Amount	Share	
(1)	(2)	(3)	(4)
Tier 1 - Territory 8	113,265,934	32.2%	12.5%
Tier 1 - Territory 9	63,953,092	18.2%	17.9%
Tier 1 - Territory 10	170,224,064	48.4%	16.8%
Tier 2	4,306,815	1.2%	13.1%
Total / Average	351,749,905	100.0%	15.6%

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)
2008	433,109	0.261	1.462	798,472	119,659,005	0.7%
2009	3,459,085	0.261	1.435	6,259,335	121,162,062	5.2%
2010	1,267,642	0.261	1.395	2,229,903	124,702,532	1.8%
2011	1,280,538	0.261	1.361	2,197,686	126,684,509	1.7%
2012	10,684,111	0.261	1.323	17,824,334	128,914,788	13.8%
2013	54,457,489	0.261	1.237	84,945,895	131,926,783	64.4%
2014	528,475	0.261	1.204	802,354	134,663,386	0.6%
2015	17,903,130	0.261	1.129	25,488,131	136,975,647	18.6%
2016	11,690,648	0.261	1.117	16,466,710	133,431,908	12.3%
2017	2,744,045	0.261	1.087	3,761,282	126,682,785	3.0%
Total	104,448,272			160,774,102	1,284,803,405	12.5%

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)
2008	480,548	0.261	1.462	885,930	63,013,519	1.4%
2009	537,344	0.261	1.435	972,343	65,908,745	1.5%
2010	3,453,514	0.261	1.395	6,075,059	69,035,414	8.8%
2011	19,246,681	0.261	1.361	33,031,558	69,387,124	47.6%
2012	20,722,135	0.261	1.323	34,570,800	70,391,274	49.1%
2013	6,221,299	0.261	1.237	9,704,337	71,513,690	13.6%
2014	1,642,120	0.261	1.204	2,493,139	74,528,934	3.3%
2015	9,672,019	0.261	1.129	13,769,754	77,646,885	17.7%
2016	10,204,350	0.261	1.117	14,373,205	76,688,491	18.7%
2017	8,285,460	0.261	1.087	11,356,938	72,582,595	15.6%
Total	80,465,470			127,233,063	710,696,671	17.9%

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)
2008	1,402,529	0.261	1.462	2,585,677	161,683,706	1.6%
2009	1,980,148	0.261	1.435	3,583,147	174,677,101	2.1%
2010	6,679,374	0.261	1.395	11,749,653	185,336,084	6.3%
2011	56,262,554	0.261	1.361	96,558,977	193,033,699	50.0%
2012	19,034,139	0.261	1.323	31,754,711	209,220,809	15.2%
2013	4,863,856	0.261	1.237	7,586,920	215,695,773	3.5%
2014	2,884,944	0.261	1.204	4,380,049	222,006,785	2.0%
2015	88,823,730	0.261	1.129	126,455,591	226,666,349	55.8%
2016	12,886,952	0.261	1.117	18,151,749	216,365,340	8.4%
2017	24,772,272	0.261	1.087	33,955,527	197,982,407	17.2%
Total	219,590,498			336,762,001	2,002,668,053	16.8%

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 and 11)

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)
2008	486,202	0.261	1.462	896,353	3,156,640	28.4%
2009	552,317	0.261	1.435	999,437	3,324,681	30.1%
2010	183,294	0.261	1.395	322,432	3,606,426	8.9%
2011	54,516	0.261	1.361	93,562	3,878,435	2.4%
2012	260,490	0.261	1.323	434,576	4,306,581	10.1%
2013	506,470	0.261	1.237	790,021	4,573,701	17.3%
2014	31,212	0.261	1.204	47,387	4,650,368	1.0%
2015	332,267	0.261	1.129	473,038	4,748,938	10.0%
2016	478,537	0.261	1.117	674,037	4,776,381	14.1%
2017	545,910	0.261	1.087	748,283	4,657,598	16.1%
Total	3,431,215			5,479,126	41,679,749	13.1%

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)
2008	433,109	1.000	433,109
2009	3,455,233	1.001	3,459,085
2010	1,264,721	1.002	1,267,642
2011	1,277,401	1.002	1,280,538
2012	10,634,874	1.005	10,684,111
2013	54,058,418	1.007	54,457,489
2014	520,624	1.015	528,475
2015	17,395,097	1.029	17,903,130
2016	10,906,736	1.072	11,690,648
2017	2,277,377	1.205	2,744,045
Total	102,223,590		104,448,272

Notes:

- (2) Exhibit 2, Sheet 4a, as of 12/31/17
- (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)
2008	480,548	1.000	480,548
2009	536,746	1.001	537,344
2010	3,445,556	1.002	3,453,514
2011	19,199,535	1.002	19,246,681
2012	20,626,638	1.005	20,722,135
2013	6,175,709	1.007	6,221,299
2014	1,617,725	1.015	1,642,120
2015	9,397,558	1.029	9,672,019
2016	9,520,101	1.072	10,204,350
2017	6,876,387	1.205	8,285,460
Total	77,876,503		80,465,470

Notes:

- (2) Exhibit 2, Sheet 4b, as of 12/31/17
- (3) Exhibit 3, Sheet 1
- (4) = (2) * (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hall
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)
2008	1,402,529	1.000	1,402,529
2009	1,977,943	1.001	1,980,148
2010	6,663,982	1.002	6,679,374
2011	56,124,736	1.002	56,262,554
2012	18,946,421	1.005	19,034,139
2013	4,828,213	1.007	4,863,856
2014	2,842,086	1.015	2,884,944
2015	86,303,198	1.029	88,823,730
2016	12,022,822	1.072	12,886,952
2017	20,559,357	1.205	24,772,272
Total	211,671,287		219,590,498

Notes:

- (2) Exhibit 2, Sheet 4c, as of 12/31/17
- (3) Exhibit 3, Sheet 1
- (4) = (2) * (3)

Texas Windstorm Insurance Association
Residential Property - Wind & Hall
Rate Level Review
 Projected Ultimate Non-Hurricane Loss
 Tier 2 -- (Territories 1 and 11)

Accident Year	TWIA Non-Hurricane Paid Loss	Development Factor	Ultimate Non-Hurricane Loss
(1)	(2)	(3)	(4)
2008	486,202	1.000	486,202
2009	551,702	1.001	552,317
2010	182,872	1.002	183,294
2011	54,382	1.002	54,516
2012	259,290	1.005	260,490
2013	502,759	1.007	506,470
2014	30,748	1.015	31,212
2015	322,838	1.029	332,267
2016	446,449	1.072	478,537
2017	453,069	1.205	545,910
Total	3,290,311		3,431,215

Notes:

- (2) Exhibit 2, Sheet 4d, as of 12/31/17
- (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 12/31/17
 Tier 1 -- Territory 8 (Galveston County)

Accident Year	Paid Loss Excluding Expense			Total
	Non-Hurricane (1)	Hurricane (2)	(3)	
2008	433,109	1,047,798,983	0	1,048,232,092
2009	3,455,233	0	0	3,455,233
2010	1,264,721	0	0	1,264,721
2011	1,277,401	0	0	1,277,401
2012	10,634,874	0	0	10,634,874
2013	54,058,418	0	0	54,058,418
2014	520,624	0	0	520,624
2015	17,395,097	0	0	17,395,097
2016	10,906,736	0	0	10,906,736
2017	2,277,377	26,767,589	0	29,044,966
Total	102,223,590	1,074,566,572	0	1,176,790,162

Notes:

- (2) 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 12/31/17
Tier 1 -- Territory 9 (Nueces County)

Accident Year	Paid Loss Excluding Expense			Total (4)
	(1)	Non-Hurricane (2)	Hurricane (3)	
2008		480,548	746,099	1,226,647
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		9,397,558	0	9,397,558
2016		9,520,101	0	9,520,101
2017		6,876,387	170,532,269	177,408,656
Total		77,876,503	171,466,222	249,342,725

Notes:

- (2) 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 12/31/17
Tier 1 -- Territory 10 (Other Tier 1)

Accident Year	Paid Loss Excluding Expense			Total
	Non-Hurricane (1)	Hurricane (2)	Hurricane (3)	
2008	1,402,529	626,579,741	0	627,982,270
2009	1,977,943	0	0	1,977,943
2010	6,663,982	1,063,585	0	7,727,567
2011	56,124,736	0	0	56,124,736
2012	18,946,421	0	0	18,946,421
2013	4,828,213	0	0	4,828,213
2014	2,842,086	0	0	2,842,086
2015	86,303,198	0	0	86,303,198
2016	12,022,822	0	0	12,022,822
2017	20,559,357	449,826,545	0	470,385,902
Total	211,671,287	1,077,469,871	0	1,289,141,158

Notes:

(2) Provided by TDI. Accident years ending 9/30/xx

(4) = (2) + (3)

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

Summary of TWIA Historical Paid Loss as of 12/31/17
Tier 2 -- (Territories 1 and 11)

Accident Year	Paid Loss Excluding Expense		
	Non-Hurricane (1)	Hurricane (2)	Total (3)
2008	486,202	36,454,055	36,940,257
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	453,069	2,596,107	3,049,176
Total	3,290,311	39,050,162	42,340,473

Notes:

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

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

Year / Quarter	Average Written premium Per 1000 amount of insurance At present rates		
(1)	(2)	(3) Current Average Earned Date	7/1/2017
2009 / 3	29.75	(4) Current Average Accident Date	7/1/2017
2010 / 3	28.96	(5) Prospective Average Earned / Accideni Date	1/1/2020
2011 / 3	28.38	(6) Premium Trend Length	2.500
2012 / 3	28.15	(7) Loss Trend Length	2.500
2013 / 3	27.04	(8) Selected Premium Trend	-1.8%
2014 / 3	27.12	(9) Selected Loss Trend	1.5%
2015 / 3	25.99		
2016 / 3	25.66		
2017 / 3	25.24		

Accident Year	Current Premium Trend	Current Loss Trend	Prospective Premium Trend	Prospective Loss Trend	Net Trend Factor
(10)	(11)	(12)	(13)	(14)	(15)
2008	0.848	1.141	0.955	1.038	1.462
2009	0.848	1.120	0.955	1.038	1.435
2010	0.872	1.119	0.955	1.038	1.395
2011	0.889	1.114	0.955	1.038	1.361
2012	0.897	1.092	0.955	1.038	1.323
2013	0.933	1.063	0.955	1.038	1.237
2014	0.931	1.031	0.955	1.038	1.204
2015	0.971	1.009	0.955	1.038	1.129
2016	0.984	1.011	0.955	1.038	1.117
2017	1.000	1.000	0.955	1.038	1.087

Notes:

- (2) Exhibit 3, Sheet 2 (9)
- (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 2017 / 3
- (12) Exhibit 3, Sheet 3a
- (13) = [1 + (8)] ^ (6)
- (14) = [1 + (9)] ^ (7)
- (15) = [(12) * (14)] / [(11) * (13)]

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

Paid Loss Development Factors
Statewide Industry Extended Coverage Dwelling Paid Loss

Accident Year	Months of Development									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2008	435,381	557,638	625,922	688,372	756,380	774,976	775,409	776,862	777,393	
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		
2011	137,269	154,006	156,583	157,456	157,929	157,995	158,032			
2012	162,844	196,788	232,373	242,523	245,227	246,785				
2013	124,050	143,359	151,995	154,466						
2014	151,510	178,253	187,490							
2015	173,851	200,069	206,331							
2016	486,124	553,143								
2017	625,228									

Accident Year	Development Factors									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2008	1.281	1.122	1.100	1.099	1.025	1.001	1.002	1.001	1.001	
2009	1.189	1.020	1.010	1.002	1.001	1.000	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				
2012	1.208	1.181	1.044	1.011	1.006					
2013	1.156	1.060	1.016	1.011						
2014	1.177	1.052	1.019							
2015	1.151	1.031								
2016	1.138									

Average	1.170	1.063	1.029	1.021	1.007	1.000	1.001	1.000	1.001	1.001
Avg 5 Year	1.166	1.068	1.019	1.006	1.007	1.000	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	1.000
Selected	1.166	1.059	1.028	1.020	1.006	1.000	1.001	1.000	1.000	1.000
Cumulative	1.302	1.117	1.055	1.027	1.007	1.001	1.001	1.000	1.000	1.000
TWIA cumulative	1.205	1.072	1.029	1.015	1.007	1.005	1.002	1.002	1.002	1.001
Selected Cumulative	1.205	1.072	1.029	1.015	1.007	1.005	1.002	1.002	1.002	1.001

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	Amount of insurance		Written Premium	On- Level Factors	Premium at Present Rate Written	Written Premium at Present Rates		Exponential Fitted Trends			
	in 1000s In-Force	AOI In-Force				Annualized Average	Annualized	All-Year	5-Year	4-Year	3-Year
(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(11)	(12)	(13)
2008 / 2	14,326,503		68,638,726	1.580	108,461,115						
2008 / 3	16,381,376		78,680,694	1.580	124,329,169						
2008 / 4	10,006,227		47,665,607	1.580	75,319,942						
2009 / 1	10,560,043		52,901,824	1.407	74,438,179	382,548,405					
2009 / 2	15,170,145	12,923,993	80,599,479	1.407	113,411,561	387,498,851	30.0	29.8			
2009 / 3	16,845,303	13,087,439	89,719,305	1.407	126,244,072	389,413,754	29.8	29.7			
2009 / 4	11,055,557	13,276,596	56,402,471	1.407	79,363,941	393,457,753	29.6	29.5			
2010 / 1	10,860,747	13,445,350	54,587,932	1.407	76,810,702	395,830,276	29.4	29.4			
2010 / 2	16,170,453	13,607,976	82,603,320	1.407	116,231,166	398,649,881	29.3	29.2			
2010 / 3	17,931,763	13,868,822	91,866,506	1.407	129,265,399	401,671,209	29.0	29.1			
2010 / 4	11,774,830	14,094,539	58,863,267	1.407	82,826,528	405,133,796	28.7	28.9			
2011 / 1	11,559,436	14,271,784	59,951,748	1.340	80,341,076	408,664,170	28.6	28.8			
2011 / 2	17,228,306	14,491,352	90,742,856	1.340	121,604,106	414,037,109	28.6	28.6			
2011 / 3	18,654,087	14,713,874	99,110,457	1.340	132,817,491	417,589,201	28.4	28.5			
2011 / 4	12,903,922	14,945,301	66,729,933	1.340	89,424,492	424,187,166	28.4	28.4			
2012 / 1	12,795,200	15,240,908	68,658,174	1.276	87,627,162	431,473,251	28.3	28.2	28.1		
2012 / 2	17,692,330	15,453,382	96,214,511	1.276	122,796,806	432,665,952	28.0	28.1	28.0		
2012 / 3	20,454,054	15,736,380	112,131,482	1.276	143,111,343	442,959,803	28.1	27.9	27.9		
2012 / 4	13,219,136	16,000,778	70,018,382	1.276	89,363,170	442,898,481	27.7	27.8	27.7		
2013 / 1	13,000,034	16,065,784	71,740,155	1.216	87,200,607	442,471,926	27.5	27.7	27.6	27.6	
2013 / 2	19,372,516	16,301,412	108,632,729	1.216	132,043,761	451,718,881	27.7	27.5	27.5	27.4	
2013 / 3	19,767,048	16,425,559	111,540,208	1.216	135,577,820	444,185,358	27.0	27.4	27.3	27.3	
2013 / 4	14,929,789	16,553,515	81,734,680	1.216	99,349,014	454,171,202	27.4	27.2	27.2	27.2	
2014 / 1	13,698,687	16,854,679	77,867,785	1.158	90,141,695	457,112,290	27.1	27.1	27.1	27.0	26.9
2014 / 2	19,342,004	16,938,196	111,616,003	1.158	129,209,475	454,278,004	26.8	27.0	26.9	26.9	26.8
2014 / 3	22,063,032	17,221,380	128,096,479	1.158	148,287,687	466,987,871	27.1	26.8	26.8	26.8	26.7
2014 / 4	15,380,056	17,564,661	86,711,448	1.158	100,379,340	468,018,197	26.6	26.7	26.7	26.7	26.5
2015 / 1	14,623,775	17,736,581	85,327,979	1.103	94,074,097	471,950,599	26.6	26.6	26.6	26.5	26.4
2015 / 2	20,629,165	18,013,112	122,581,230	1.103	135,145,806	477,886,929	26.5	26.4	26.4	26.4	26.3
2015 / 3	21,359,938	18,086,120	127,421,809	1.103	140,482,544	470,081,787	26.0	26.3	26.3	26.3	26.2
2015 / 4	14,888,938	17,936,844	87,342,988	1.103	96,295,644	465,998,092	26.0	26.2	26.2	26.2	26.1
2016 / 1	13,888,469	17,783,541	84,557,230	1.050	88,785,092	460,709,086	25.9	26.0	26.0	26.0	26.0
2016 / 2	20,332,341	17,654,525	125,845,764	1.050	132,138,052	457,701,332	25.9	25.9	25.9	25.9	25.9
2016 / 3	19,861,484	17,430,115	123,784,247	1.050	129,973,459	447,192,247	25.7	25.8	25.8	25.8	25.8
2016 / 4	13,428,971	17,060,312	81,959,449	1.050	86,057,421	436,954,025	25.6	25.6	25.7	25.7	25.7
2017 / 1	13,100,671	16,779,341	79,037,984	1.050	82,989,883	431,158,816	25.7	25.5	25.5	25.6	25.6
2017 / 2	18,690,343	16,475,617	114,547,681	1.050	120,275,065	419,295,829	25.4	25.4	25.4	25.4	25.5
2017 / 3	17,533,581	15,979,379	108,614,623	1.050	114,045,354	403,367,724	25.2	25.3	25.3	25.3	25.4
2017 / 4	12,103,071	15,522,654	73,697,340	1.050	77,382,207	394,692,509	25.4	25.1	25.2	25.2	25.2
(14) Average Annual Change								-2.0%	-1.9%	-1.9%	-1.7%
(15) Correlation Coefficient								98.8%	96.8%	94.9%	93.2%
(16) Selected Premium Trend											-1.8%

Notes: (2) Provided by TWIA (9) = (8) / (3)
(3) Calculated from (2) using uniform quarterly writing assumption (10) - (13) = (9) fitted to an exponential distribution
(4) Provided by TWIA (14) Fitted average annual change
(5) Cumulative effect of annual rate changes (15) Evaluates the predictability of the fitted curve
(6) = (4) * (5) Indexed to 2017 / 4 (16) Selected based on judgment

(8) = Sum of for prior 4 quarters

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)
2008	1.164	1.163	1.073	1.141
2009	1.138	1.132	1.083	1.120
2010	1.134	1.130	1.087	1.119
2011	1.121	1.126	1.076	1.114
2012	1.097	1.105	1.052	1.092
2013	1.063	1.069	1.045	1.063
2014	1.030	1.029	1.035	1.031
2015	1.004	1.004	1.022	1.009
2016	1.011	1.012	1.007	1.011
2017	1.000	1.000	1.000	1.000

Factors to Adjust For Prospective Loss Costs

(6) Fitted Trend	1.5%	1.6%	1.1%	1.5%
(7) Cost Factor	1.042	1.045	1.031	1.042

Notes:

- (2) = Exhibit 3, Sheet 3b trended forward to 9/30/2017
- (3) = Exhibit 3, Sheet 3c trended forward to 9/30/2017
- (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 4/1/2017 to 1/1/2020)

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

Calendar Year Ending	Texas Statewide Index	Fitted Trends		5 Years		4 Years		3 Years		Exponential
		All Years Linear	Exponential	Linear	Exponential	Linear	Exponential	Linear	Exponential	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
3/31/2008	1982.41	1965.26	1970.97							
6/30/2008	1990.80	1975.40	1980.23							
9/30/2008	1998.73	1985.55	1989.54							
12/31/2008	2006.58	1995.69	1998.90							
3/31/2009	2017.74	2005.83	2008.30							
6/30/2009	2034.78	2015.97	2017.74							
9/30/2009	2043.22	2026.12	2027.22							
12/31/2009	2046.48	2036.26	2036.75							
3/31/2010	2047.16	2046.40	2046.33							
6/30/2010	2046.06	2056.54	2055.95							
9/30/2010	2050.43	2066.69	2065.62							
12/31/2010	2057.86	2076.83	2075.33							
3/31/2011	2065.01	2086.97	2085.08							
6/30/2011	2070.12	2097.11	2094.89							
9/30/2011	2075.68	2107.26	2104.74							
12/31/2011	2083.08	2117.40	2114.63							
3/31/2012	2092.60	2127.54	2124.57							
6/30/2012	2103.60	2137.68	2134.56							
9/30/2012	2121.39	2147.83	2144.60							
12/31/2012	2139.89	2157.97	2154.68							
3/31/2013	2155.38	2168.11	2164.81	2191.52	2191.61					
6/30/2013	2172.48	2178.25	2174.99	2200.03	2199.91					
9/30/2013	2188.26	2188.40	2185.21	2208.54	2208.24					
12/31/2013	2202.59	2198.54	2195.48	2217.06	2216.60					
3/31/2014	2219.60	2208.68	2205.81	2225.57	2224.99	2254.24	2254.15			
6/30/2014	2238.93	2218.82	2216.18	2234.09	2233.42	2259.75	2259.60			
9/30/2014	2257.35	2228.97	2226.60	2242.60	2241.87	2265.26	2265.06			
12/31/2014	2275.49	2239.11	2237.06	2251.12	2250.36	2270.78	2270.54			
3/31/2015	2293.52	2249.25	2247.58	2259.63	2258.89	2276.29	2276.03	2301.75	2301.77	
6/30/2015	2307.48	2259.39	2258.15	2268.14	2267.44	2281.80	2281.54	2303.52	2303.53	
9/30/2015	2315.94	2269.54	2268.76	2276.66	2276.02	2287.31	2287.06	2305.29	2305.29	
12/31/2015	2319.83	2279.68	2279.43	2285.17	2284.64	2292.83	2292.59	2307.06	2307.05	
3/31/2016	2316.36	2289.82	2290.15	2293.69	2293.29	2298.34	2298.13	2308.84	2308.81	
6/30/2016	2308.33	2299.96	2300.91	2302.20	2301.98	2303.85	2303.69	2310.61	2310.57	
9/30/2016	2301.17	2310.11	2311.73	2310.71	2310.69	2309.36	2309.26	2312.38	2312.34	
12/31/2016	2296.45	2320.25	2322.60	2319.23	2319.44	2314.87	2314.85	2314.15	2314.10	
3/31/2017	2299.30	2330.39	2333.52	2327.74	2328.23	2320.39	2320.45	2315.93	2315.87	
6/30/2017	2309.66	2340.53	2344.49	2336.26	2337.04	2325.90	2326.06	2317.70	2317.64	
9/30/2017	2326.19	2350.68	2355.51	2344.77	2345.89	2331.41	2331.69	2319.47	2319.41	
12/31/2017	2343.70	2360.82	2366.59	2353.28	2354.78	2336.92	2337.33	2321.24	2321.18	
Annual Trend		1.7%	1.9%	1.4%	1.5%	0.9%	1.0%	0.3%	0.3%	
R-Squared		0.957	0.960	0.799	0.796	0.642	0.641	0.204	0.203	

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)

Calendar Year Ending	Texas Coastal Index	Fitted Trends		5 Years		4 Years		3 Years		Exponential
		All Years Linear	Exponential	Linear	Exponential	Linear	Exponential	Linear	Exponential	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
3/31/2008	1991.21	1978.99	1984.77							
6/30/2008	2002.80	1989.04	1993.95							
9/30/2008	2013.23	1999.08	2003.17							
12/31/2008	2024.37	2009.13	2012.43							
3/31/2009	2036.37	2019.17	2021.73							
6/30/2009	2055.55	2029.22	2031.08							
9/30/2009	2068.58	2039.26	2040.47							
12/31/2009	2075.34	2049.31	2049.91							
3/31/2010	2075.01	2059.35	2059.39							
6/30/2010	2072.68	2069.40	2068.91							
9/30/2010	2070.90	2079.44	2078.48							
12/31/2010	2070.54	2089.49	2088.09							
3/31/2011	2073.35	2099.53	2097.74							
6/30/2011	2074.41	2109.58	2107.44							
9/30/2011	2078.04	2119.62	2117.19							
12/31/2011	2083.41	2129.67	2126.97							
3/31/2012	2089.91	2139.71	2136.81							
6/30/2012	2099.29	2149.76	2146.69							
9/30/2012	2118.77	2159.80	2156.62							
12/31/2012	2139.83	2169.85	2166.59							
3/31/2013	2157.69	2179.89	2176.61	2197.96	2197.97					
6/30/2013	2175.59	2189.94	2186.67	2207.02	2206.80					
9/30/2013	2189.58	2199.98	2196.78	2216.09	2215.66					
12/31/2013	2203.33	2210.03	2206.94	2225.15	2224.56					
3/31/2014	2227.66	2220.07	2217.14	2234.21	2233.49	2268.86	2268.73			
6/30/2014	2252.59	2230.12	2227.40	2243.28	2242.46	2274.31	2274.12			
9/30/2014	2274.95	2240.16	2237.69	2252.34	2251.47	2279.75	2279.53			
12/31/2014	2296.72	2250.21	2248.04	2261.40	2260.51	2285.19	2284.94			
3/31/2015	2310.53	2260.26	2258.44	2270.47	2269.59	2290.64	2290.37	2315.97	2316.01	
6/30/2015	2322.48	2270.30	2268.88	2279.53	2278.71	2296.08	2295.81	2317.66	2317.68	
9/30/2015	2330.34	2280.35	2279.37	2288.59	2287.86	2301.53	2301.26	2319.35	2319.35	
12/31/2015	2333.21	2290.39	2289.91	2297.66	2297.05	2306.97	2306.73	2321.04	2321.03	
3/31/2016	2328.60	2300.44	2300.50	2306.72	2306.28	2312.41	2312.21	2322.73	2322.70	
6/30/2016	2320.74	2310.48	2311.13	2315.78	2315.54	2317.86	2317.70	2324.42	2324.38	
9/30/2016	2313.53	2320.53	2321.82	2324.85	2324.84	2323.30	2323.20	2326.11	2326.06	
12/31/2016	2308.10	2330.57	2332.56	2333.91	2334.18	2328.75	2328.72	2327.80	2327.74	
3/31/2017	2311.17	2340.62	2343.34	2342.97	2343.55	2334.19	2334.25	2329.48	2329.42	
6/30/2017	2323.72	2350.66	2354.18	2352.04	2352.96	2339.63	2339.80	2331.17	2331.10	
9/30/2017	2340.72	2360.71	2365.06	2361.10	2362.42	2345.08	2345.35	2332.86	2332.78	
12/31/2017	2360.00	2370.75	2376.00	2370.16	2371.90	2350.52	2350.92	2334.55	2334.47	
Annual Trend		1.7%	1.9%	1.5%	1.6%	0.9%	1.0%	0.3%	0.3%	
R-Squared		0.938	0.941	0.776	0.773	0.604	0.602	0.168	0.167	

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

Calendar Year Ending	Modified CPI	Fitted Trends		5 Years		4 Years		3 Years	
		All Years Linear	Exponential	Linear	Exponential	Linear	Exponential	Linear	Exponential
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
9/30/2007	178.34	176.37	176.53						
12/31/2007	179.24	176.78	176.92						
3/31/2008	180.31	177.20	177.32						
6/30/2008	180.58	177.62	177.72						
9/30/2008	181.04	178.04	178.12						
12/31/2008	181.06	178.46	178.53						
3/31/2009	180.55	178.88	178.93						
6/30/2009	180.07	179.30	179.33						
9/30/2009	179.30	179.72	179.74						
12/31/2009	178.80	180.14	180.14						
3/31/2010	178.46	180.55	180.55						
6/30/2010	178.56	180.97	180.96						
9/30/2010	178.59	181.39	181.37						
12/31/2010	178.72	181.81	181.78						
3/31/2011	178.97	182.23	182.19						
6/30/2011	179.61	182.65	182.60						
9/30/2011	180.52	183.07	183.01						
12/31/2011	181.55	183.49	183.42						
3/31/2012	182.78	183.91	183.84						
6/30/2012	183.87	184.32	184.25						
9/30/2012	184.57	184.74	184.67						
12/31/2012	185.03	185.16	185.08						
3/31/2013	185.38	185.58	185.50	184.74	184.78				
6/30/2013	185.51	186.00	185.92	185.28	185.31				
9/30/2013	185.82	186.42	186.34	185.82	185.84				
12/31/2013	186.03	186.84	186.76	186.36	186.37				
3/31/2014	186.43	187.26	187.18	186.90	186.90	186.72	186.74		
6/30/2014	186.87	187.68	187.60	187.44	187.43	187.28	187.29		
9/30/2014	187.59	188.09	188.03	187.98	187.97	187.84	187.84		
12/31/2014	188.62	188.51	188.45	188.52	188.50	188.40	188.40		
3/31/2015	189.46	188.93	188.88	189.06	189.04	188.96	188.95	189.28	189.29
6/30/2015	189.59	189.35	189.30	189.60	189.58	189.52	189.51	189.79	189.79
9/30/2015	190.03	189.77	189.73	190.15	190.12	190.08	190.06	190.30	190.30
12/31/2015	190.50	190.19	190.16	190.69	190.66	190.64	190.62	190.82	190.81
3/31/2016	190.95	190.61	190.59	191.23	191.20	191.20	191.19	191.33	191.32
6/30/2016	192.03	191.03	191.02	191.77	191.75	191.76	191.75	191.85	191.84
9/30/2016	192.82	191.45	191.45	192.31	192.30	192.32	192.31	192.36	192.35
12/31/2016	193.56	191.86	191.88	192.85	192.84	192.88	192.88	192.88	192.87
3/31/2017	193.86	192.28	192.32	193.39	193.39	193.45	193.45	193.39	193.39
6/30/2017	194.07	192.70	192.75	193.93	193.95	194.01	194.02	193.90	193.91
9/30/2017	194.20	193.12	193.18	194.47	194.50	194.57	194.59	194.42	194.43
12/31/2017	194.18	193.54	193.62	195.01	195.05	195.13	195.16	194.93	194.95
Annual Trend		0.9%	0.9%	1.1%	1.1%	1.1%	1.2%	1.1%	1.1%
R-Squared		0.897	0.898	0.983	0.983	0.976	0.975	0.950	0.950

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 (1)	Projected Ultimate LAE (2)	Ultimate LAE to Loss Ratio (3)	Hurricane Indicator (4)
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		15,745	1,110	0.070
2007		15,745	4,941	0.314 H
2008		2,583,017	346,615	0.134 H
2009		10,417	2,222	0.213
2010		18,052	4,288	0.238
2011		96,309	15,209	0.158
2012		67,320	15,896	0.236
2013		70,787	13,941	0.197
2014		7,203	7,159	0.994
2015		139,335	39,896	0.286
2016		28,961	15,886	0.549
2017		1,385,687	260,464	0.188 H
All Years Total		5,017,065	794,404	0.158
Hurricane Years Total		4,478,291	654,243	0.146
Non-Hurricane Years				
Total		538,774	140,161	0.260
10 Year		438,384	114,497	0.261

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 12/31/17	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			15,745
2007			15,745
2008			2,583,017
2009			10,417
2010			18,052
2011	96,309	1.000	96,309
2012	67,658	0.995	67,320
2013	71,286	0.993	70,787
2014	7,261	0.992	7,203
2015	140,459	0.992	139,335
2016	29,612	0.978	28,961
2017	1,278,467	1.084	1,385,687

Notes:

(2) Exhibit 4, Sheet 3

(3) Exhibit 4, Sheet 3

(4) 2011 - 2017: (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)

Accident Year	Months of Development							
	12 (1)	24 (2)	36 (3)	48 (4)	60 (5)	72 (6)	84 (7)	84 (8)
2008		1,902,481	1,774,393	2,273,398	2,384,020	2,680,497	2,632,000	2,583,017
2009		8,267	10,825	10,581	10,732	10,453	10,404	10,417
2010		15,215	18,166	18,173	18,522	18,361	18,267	18,052
2011		94,870	96,967	97,503	96,828	96,263	95,964	96,309
2012		62,722	69,764	67,287	66,724	66,328	67,658	
2013		77,204	75,204	72,860	71,823	71,286		
2014		6,739	7,854	7,298	7,261			
2015		147,927	139,955	140,459				
2016		31,292	29,612					
2017		1,278,467						

Accident Year	Development Factors						
	12 - 24 (1)	24 - 36 (2)	36 - 48 (3)	48 - 60 (4)	60 - 72 (5)	72 - 84 (6)	84 - Ult (7)
2008		0.933	1.281	1.049	1.124	0.982	0.981
2009		1.309	0.977	1.014	0.974	0.995	1.001
2010		1.194	1.000	1.019	0.991	0.995	0.988
2011		1.022	1.006	0.993	0.994	0.997	1.004
2012		1.112	0.964	0.992	0.994	1.020	
2013		0.974	0.969	0.986	0.993		
2014		1.165	0.929	0.995			
2015		0.946	1.004				
2016		0.946					

Average		1.067	1.016	1.007	1.012	0.998	0.994	
Avg x hi / lo		1.051	0.987	1.003	0.993	0.996	0.995	
Avg 3 Year		1.019	0.967	0.991	0.994	1.004	0.998	
Avg 5 Year		1.029	0.974	0.997	0.989	0.998	0.994	
Prior		1.054	0.984	1.003	1.005	0.993	0.993	1.000
Selected		1.044	0.986	1.000	0.999	0.998	0.995	1.000
Cumulative		1.021	0.978	0.992	0.992	0.993	0.995	1.000

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

Accident Year	Incurred ALAE at 12/31/17	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				235	357
1989				2,727	3,528
1990				119	225
1991				403	729
1992				270	554
1993				806	1,375
1994				192	507
1995				698	903
1996				355	582
1997				892	1,343
1998				3,920	4,732
1999				1,757	2,388
2000				1,209	1,885
2001				1,207	1,880
2002				3,643	5,226
2003				3,239	5,122
2004				844	1,471
2005				15,229	20,235
2006				860	1,110
2007	2,489	1.000		2,489	4,941
2008	99,668	1.000		99,668	346,615
2009	223	1.000		223	2,222
2010	323	1.000		323	4,288
2011	798	1.000		798	15,209
2012	880	1.025		902	15,896
2013	991	1.018		1,009	13,941
2014	1,266	1.074		1,360	7,159
2015	2,355	1.181		2,781	39,896
2016	678	1.216		824	15,886
2017	891	1.398		1,246	260,464

Notes:

- (2) Exhibit 4, Sheet 5
- (3) Exhibit 4, Sheet 5
- (4) 2008 - 2017: (2) * (3); 1986 - 2007: from TWIA's annual statements
- (5) From TWIA's annual statements
- (6) 1986 - 2016: (4) + (5); prior years from prior TWIA annual statements. 2017: developed separately for Hurricane Harvey

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

Accident Year	<u>Months of Development</u>							
	12 (1)	24 (2)	36 (3)	48 (4)	60 (5)	72 (6)	84 (7)	(8)
2007		2,660	3,107	2,921	2,519	2,497	2,490	2,489
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	798
2012		516	679	719	632	917	880	
2013		802	806	715	1,089	991		
2014		516	493	1,085	1,266			
2015		973	1,818	2,355				
2016		412	678					
2017		891						

Accident Year	<u>Development Factors</u>							
	12 - 24 (1)	24 - 36 (2)	36 - 48 (3)	48 - 60 (4)	60 - 72 (5)	72 - 84 (6)	84 - Ult (7)	(8)
2007		1.168	0.940	0.862	0.991	0.997	1.000	
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	1.071	
2012		1.316	1.059	0.879	1.451	0.960		
2013		1.005	0.887	1.523	0.910			
2014		0.955	2.201	1.167				
2015		1.868	1.295					
2016		1.646						

Average		1.079	1.093	1.075	1.054	0.979	1.029	
Avg x hi / lo		1.109	1.001	1.036	1.003	0.981	1.024	
Avg 3 Year		1.490	1.461	1.190	1.094	1.037	1.023	
Avg 5 Year		1.358	1.294	1.134	1.062	0.976	1.029	
Prior		1.150	1.030	0.987	0.996	0.952	1.009	1.000
Selected		1.150	1.030	1.100	1.055	0.993	1.025	1.000
Cumulative		1.398	1.216	1.181	1.074	1.018	1.025	1.000

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

Basis for Hurricane Loss Ratio (1)	Indicated Loss Ratio (2)	LAE Factor (3)	Indicated Loss & LAE Ratio (4)
Industry Experience	36.2%	0.146	41.5%
<u>Hurricane Models</u>			
AIR Model	47.9%	0.146	54.9%
RMS Model	40.6%	0.146	46.5%
Average of Models	44.3%	0.146	50.8%

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 - 2017 -- 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	410.6%
1986	95,974,159	9.7%
1989	109,248,693	7.0%
1990	105,685,439	16.6%
1999	184,177,968	8.6%
2003	225,873,236	20.9%
2005	248,665,748	115.9%
2007	384,632,941	5.2%
2008	477,636,241	414.1%
2017	559,441,095	213.5%
<hr/>		
(4)	Simple Average Loss Ratio for Hurricane Years	104.0%
(5)	Selected Non-Hurricane Loss Ratio	9.4%
(6)	Average Hurricane Loss Ratio for Hurricane Years	94.6%
(7)	Historical Hurricane Frequency	
	(a) 52-Year (1/1/1966 - 12/31/2017)	0.288 (1 Hurricane Every 3.5 years)
	(a) 167-Year (1/1/1851 - 12/31/2017)	0.383 (1 Hurricane Every 2.6 years)
	Selected Frequency	0.383 (1 Hurricane Every 2.6 years)
(8)	Indicated Hurricane Loss Ratio	36.2%

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 & Hall
Rate Level Review

Industry Experience -- Residential Extended Coverage
1966 - 2017

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		410.6%	H
1984	20,078,668	34,626,400	52,545,874		12.6%	
1985	30,043,452	53,801,222	78,623,714		5.3%	
1986	36,673,352		95,974,159		9.7%	H
1987	41,598,709		108,863,822		2.4%	
1988	45,044,392		117,881,171		10.4%	
1989	41,745,774		109,248,693		7.0%	H
1990	40,384,195		105,685,439		16.6%	H
1991	46,237,137		121,002,587		71.5%	
1992	44,512,572		116,489,403		6.4%	
1993	50,741,120		132,789,511		10.2%	
1994	57,584,585		150,698,859		5.0%	
1995	60,740,049		158,956,710		6.9%	
1996	71,865,572		188,072,202		3.5%	
1997	79,154,547		207,147,449		4.4%	
1998	80,238,260		209,983,524		19.4%	
1999	71,026,552		184,177,968		8.6%	H
2000	75,114,174		179,188,154		5.6%	
2001	74,726,401		150,432,999		7.4%	
2002	86,289,350		173,710,570		17.0%	
2003	112,200,741		225,873,236		20.9%	H
2004	123,050,217		236,207,042		1.7%	
2005	135,380,924		248,665,748		115.9%	H
2006	154,699,767		283,468,384		2.0%	
2007	219,914,305		384,632,941		5.2%	H
2008	289,558,186		477,636,241		414.1%	H
2009	327,305,758		490,534,995		1.8%	
2010	355,219,215		499,964,244		3.9%	
2011	370,875,863		509,107,482		19.1%	
2012	406,981,851		532,077,164		13.6%	
2013	440,952,159		549,111,155		16.4%	
2014	477,983,216		567,000,312		2.3%	
2015	517,579,765		584,847,630		24.9%	
2016	541,982,800		583,476,869		8.4%	
2017	532,801,042		559,441,095		213.5%	H
Total / Average	6,344,271,046	413,720,932	10,195,940,787		34.9%	
Average of Non-Hurricane Years Selected					9.4%	

Notes: (2), (3) Provided by TDI. Accident years ending 9/30/xx as of 12/31/2017
(4) 1983 - 2016: 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 - 2016: 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

Accident Year	Loss Ratios by Territory / Tier				Weighted Loss Ratio
	Territory 8 (1)	Territory 9 (3)	Territory 10 (4)	Tier 2 (5)	
1983	1052.2%	6.2%	142.5%	145.2%	410.6%
1984	3.2%	5.8%	20.8%	33.1%	12.6%
1985	1.7%	7.1%	6.9%	11.1%	5.3%
1986	1.0%	2.4%	18.2%	12.1%	9.7%
1987	0.5%	3.5%	3.2%	6.3%	2.4%
1988	4.9%	6.0%	15.8%	6.4%	10.4%
1989	5.5%	5.7%	8.3%	15.3%	7.0%
1990	28.9%	10.4%	10.6%	21.3%	16.6%
1991	58.5%	12.9%	103.5%	15.4%	71.5%
1992	1.2%	11.4%	7.7%	17.5%	6.4%
1993	12.5%	11.0%	8.0%	21.4%	10.2%
1994	2.3%	5.7%	6.4%	7.6%	5.0%
1995	2.8%	8.6%	8.6%	22.5%	6.9%
1996	1.3%	4.7%	4.4%	9.0%	3.5%
1997	1.7%	4.0%	6.3%	7.7%	4.4%
1998	17.6%	9.9%	24.4%	9.3%	19.4%
1999	2.0%	17.2%	9.8%	9.8%	8.6%
2000	0.9%	2.4%	9.7%	10.9%	5.6%
2001	5.4%	7.8%	7.9%	35.6%	7.4%
2002	24.4%	5.8%	16.5%	10.6%	17.0%
2003	5.1%	8.2%	36.5%	10.3%	20.9%
2004	1.3%	1.9%	1.9%	3.9%	1.7%
2005	51.1%	2.7%	203.6%	37.2%	115.9%
2006	1.0%	1.7%	2.8%	4.9%	2.0%
2007	2.7%	1.6%	8.3%	4.9%	5.2%
2008	694.6%	2.2%	382.3%	418.4%	414.1%
2009	2.9%	0.9%	1.3%	9.4%	1.8%
2010	1.2%	5.6%	4.8%	10.9%	3.9%
2011	1.0%	27.3%	28.4%	6.0%	19.1%
2012	8.3%	28.9%	9.5%	85.0%	13.6%
2013	40.7%	9.1%	2.8%	19.7%	16.4%
2014	0.5%	2.5%	3.1%	17.7%	2.3%
2015	12.7%	12.2%	37.5%	35.2%	24.9%
2016	8.2%	12.6%	6.3%	35.3%	8.4%
2017	31.3%	310.8%	301.8%	65.9%	213.5%
Average	59.7%	16.5%	42.0%	34.1%	43.0%

TWIA 2017 Written Premium by Territory / Tier

	Territory 8	Territory 9	Territory 10	Tier 2	Total
(7) Amount	113,265,934	63,953,092	170,224,064	4,306,815	351,749,905
(8) % Share	32.2%	18.2%	48.4%	1.2%	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 (8)
- (7) Provided by TWIA
- (8) = (7) / (7) Total

Texas Windstorm Insurance Association
Residential Property - Wind & Hall
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
(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	845,510,367	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	54,326,145	40.7%
2014	114,784,032	1.186	136,160,810	691,708	0.5%
2015	122,782,019	1.130	138,739,529	17,627,980	12.7%
2016	127,007,324	1.077	136,730,973	11,223,165	8.2%
2017	125,901,232	1.050	132,196,294	41,320,919	31.3%
Total	1,426,513,764		2,150,261,647	1,193,963,279	55.5%

Notes:

(2) Provided by TDI. Accident years ending 9/30/xx as of 12/31/2017

(3) 1998 and prior judgementally selected; 1999 - 2017 based on TWIA on-level factors

(4) = (2) * (3)

(5) Provided by TDI. Accidn't yrs ending 9/30/xx as of 12/31/2017, 2017 incurred loss was developed, LDF of 1.27 was judgemently selected

(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	3,907,712	2.617	10,226,482	1,170,578	11.4%
1993	4,552,395	2.617	11,913,618	1,312,776	11.0%
1994	5,710,806	2.617	14,945,179	856,369	5.7%
1995	6,908,552	2.617	18,079,681	1,552,987	8.6%
1996	8,568,168	2.617	22,422,896	1,061,115	4.7%
1997	8,425,344	2.617	22,049,125	882,561	4.0%
1998	8,803,621	2.617	23,039,076	2,289,890	9.9%
1999	8,465,256	2.593	21,951,138	3,778,386	17.2%
2000	8,437,094	2.386	20,127,057	485,581	2.4%
2001	8,894,552	2.013	17,905,775	1,394,445	7.8%
2002	10,534,795	2.013	21,207,776	1,227,528	5.8%
2003	13,881,847	2.013	27,945,784	2,295,803	8.2%
2004	15,458,506	1.920	29,674,129	569,877	1.9%
2005	17,471,646	1.837	32,091,670	872,451	2.7%
2006	19,888,512	1.832	36,443,263	621,501	1.7%
2007	29,704,042	1.749	51,952,751	833,793	1.6%
2008	40,565,108	1.650	66,913,548	1,468,028	2.2%
2009	46,363,445	1.499	69,485,158	615,469	0.9%
2010	51,529,115	1.407	72,526,243	4,059,049	5.6%
2011	52,931,755	1.373	72,660,303	19,843,778	27.3%
2012	56,334,273	1.307	73,649,919	21,288,440	28.9%
2013	60,101,696	1.245	74,843,747	6,825,640	9.1%
2014	65,642,137	1.186	77,866,986	1,913,725	2.5%
2015	72,124,134	1.130	81,497,832	9,945,528	12.2%
2016	76,436,084	1.077	82,288,012	10,408,131	12.6%
2017	76,852,842	1.050	80,695,484	250,792,709	310.8%
Total	806,839,198		1,208,583,488	353,483,847	29.2%

Notes:

(2) Provided by TDI. Accident years ending 9/30/xx as of 12/31/2017

(3) 1998 and prior judgementally selected; 1999 - 2017 based on TWIA on-level factors

(4) = (2) * (3)

(5) Provided by TDI. Accidn't yrs ending 9/30/xx as of 12/31/2017, 2017 incurred loss was developed, LDF of 1.27 was judgementally selected

(6) = (5) / (4)

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

Exhibit 6
Sheet 6

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	694,904,589	382.3%
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	59,088,922	28.4%
2012	170,159,709	1.307	222,462,243	21,186,181	9.5%
2013	183,495,510	1.245	228,504,225	6,500,406	2.8%
2014	197,640,983	1.186	234,448,607	7,288,029	3.1%
2015	212,320,998	1.130	239,915,547	89,867,114	37.5%
2016	218,795,204	1.077	235,546,111	14,874,859	6.3%
2017	212,316,868	1.050	222,932,711	672,898,630	301.8%
Total	2,122,307,990		3,029,214,320	1,820,888,991	60.1%

Notes:

(2) Provided by TDI. Accident years ending 9/30/xx as of 12/31/2017

(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 12/31/2017, 2017 incurred loss was developed, LDF of 1.27 was judgementally selected

(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	448,713,776	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	89,824,731	85.0%
2013	90,250,703	1.245	112,387,856	22,121,863	19.7%
2014	99,916,064	1.186	118,523,910	20,983,494	17.7%
2015	110,352,614	1.130	124,694,722	43,893,738	35.2%
2016	119,744,188	1.077	128,911,773	45,534,755	35.3%
2017	117,730,100	1.050	123,616,605	81,475,245	65.9%
Total	1,615,679,851		2,937,174,858	1,011,907,046	34.5%

Notes:

(2) Provided by TDI. Accident years ending 9/30/xx as of 12/31/2017

(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 12/31/2017, 2017 incurred loss was developed, LDF of 1.27 was judgementally selected

(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 9/30/17	Modeled Loss Cost	Expected Annual Hurricane Loss
(1)	(2)	(3)	(4)
Aransas	1,963,410	2.745	5,389,560
Brazoria	12,036,704	1.700	20,462,397
Calhoun	931,361	3.222	3,000,845
Cameron	2,931,353	1.650	4,836,732
Chambers	1,737,374	1.708	2,967,435
Galveston	20,414,837	3.986	81,373,540
Harris	1,137,651	4.359	4,959,021
Jefferson	7,523,764	2.021	15,205,527
Kenedy	6,251	1.136	7,101
Kleberg	221,831	1.010	224,049
Matagorda	1,250,800	2.804	3,507,243
Nueces	11,774,819	2.635	31,026,648
Refugio	87,685	1.653	144,943
San Patricio	2,134,147	2.001	4,270,428
Willacy	93,705	1.888	176,915
Total	64,245,692	2.847	177,552,384
(5) Inforce-Premium as of Nov 30, 2017 at Present Rates			370,391,444
(6) Indicated Hurricane Loss Ratio			47.9%

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 11/30/17	Average Annual Modeled Loss	Provision for Storm Surge	Modeled Loss Cost
(1)	(2)	(3)	(4)	(5)
Aransas	1,963,410	5,367,671	1.004	2.745
Brazoria	12,036,704	20,381,898	1.004	1.700
Calhoun	931,361	2,989,175	1.004	3.222
Cameron	2,931,353	4,818,019	1.004	1.650
Chambers	1,737,374	2,956,471	1.004	1.708
Galveston	20,414,837	81,050,340	1.004	3.986
Harris	1,137,651	4,939,319	1.004	4.359
Jefferson	7,523,764	15,142,422	1.004	2.021
Kenedy	6,251	7,072	1.004	1.136
Kleberg	221,831	223,183	1.004	1.010
Matagorda	1,250,800	3,492,699	1.004	2.804
Nueces	11,774,819	30,907,167	1.004	2.635
Refugio	87,685	144,332	1.004	1.653
San Patricio	2,134,147	4,253,548	1.004	2.001
Willacy	93,705	176,168	1.004	1.888
Total	64,245,692	176,849,484	1.004	2.764

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 9/30/17	Modeled Loss Cost	Expected Annual Hurricane Loss
(1)	(2)	(3)	(4)
Aransas	1,963,410	2.493	4,894,781
Brazoria	12,036,704	1.670	20,101,296
Calhoun	931,361	3.713	3,458,143
Cameron	2,931,353	1.919	5,625,266
Chambers	1,737,374	1.663	2,889,253
Galveston	20,414,837	3.069	62,653,135
Harris	1,137,651	2.940	3,344,694
Jefferson	7,523,764	1.910	14,370,389
Kenedy	6,251	2.511	15,696
Kleberg	221,831	1.515	336,074
Matagorda	1,250,800	2.824	3,532,259
Nueces	11,774,819	2.086	24,562,272
Refugio	87,685	2.304	202,026
San Patricio	2,134,147	1.962	4,187,196
Willacy	93,705	2.617	245,226
Total	64,245,692	2.341	150,417,706
(5) Inforce-Premium as of Nov 30, 2017 at Present Rates			370,391,444
(6) Indicated Hurricane Loss Ratio			40.6%

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 11/30/17	Average Annual Modeled Loss	Provision for Storm Surge	Modeled Loss Cost
(1)	(2)	(3)	(4)	(5)
Aransas	1,963,410	4,807,803	1.018	2.493
Brazoria	12,036,704	19,746,470	1.018	1.670
Calhoun	931,361	3,396,843	1.018	3.713
Cameron	2,931,353	5,524,913	1.018	1.919
Chambers	1,737,374	2,837,696	1.018	1.663
Galveston	20,414,837	61,537,308	1.018	3.069
Harris	1,137,651	3,285,989	1.018	2.940
Jefferson	7,523,764	14,115,372	1.018	1.910
Kenedy	6,251	15,417	1.018	2.511
Kleberg	221,831	330,086	1.018	1.515
Matagorda	1,250,800	3,469,965	1.018	2.824
Nueces	11,774,819	24,128,500	1.018	2.086
Refugio	87,685	198,495	1.018	2.304
San Patricio	2,134,147	4,112,242	1.018	1.962
Willacy	93,705	240,878	1.018	2.617
Total	64,245,692	147,747,977	1.018	2.341

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 - 2017

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

Frequency	Date Period	Hurricanes	Period	Annual Frequency
52-Year	1/1/1966 - 12/31/2017	15	52	0.288
167-Year	1/1/1851 - 12/31/2017	64	167	0.383

Notes:

(1), (2) from NOAA Technical Memorandum NWS TPC-5, updated with actual experience through 2017

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)
2008	72,541,071	1.650	119,659,005
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
Total	1,018,155,629		1,284,803,405

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)
2008	38,200,787	1.650	63,013,519
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
Total	564,948,760		710,696,671

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)
2008	98,017,773	1.650	161,683,706
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
Total	1,597,393,413		2,002,668,053

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)
2008	1,913,655	1.650	3,156,640
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
Total	33,482,126		41,679,749

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
Total	3,263,962,577		4,107,876,878

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	2014	2015	2016	Selected
(1) Direct Written Premium	\$503,824,316	\$487,353,537	\$423,074,138	
(2) Direct Earned Premium	501,721,842	496,456,941	451,347,130	
(3) Commission				
\$ Amount	80,599,761	77,986,786	67,661,211	
% 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	\$27,800,836	\$26,421,698	\$26,359,831	
Adjustments				
Contribution to Statutory Fund	0	0	0	
Adjusted \$ Amount	27,800,836	26,421,698	26,359,831	
% of DWP	5.5%	5.4%	6.2%	5.7%
(6) Taxes, Licenses & Fees				
\$ Amount	\$9,828,083	\$9,626,596	\$8,281,293	
% of DWP	2.0%	2.0%	2.0%	2.0%
(7) Reinsurance Expense				16.0%
(8) Outstanding Class 1 Public Security Repayment				18.6%
(9) Total Fixed Expenses				40.3%
(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 Repayment issued in 2015. Security depleted due to Hurricane Harvey
- (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) 2018 - 2019 Reinsurance Premium	106,196,289
(2a) Average Annual Loss by Reinsurance Layer (AIR) 100% of \$2600M XS \$2000M	44,540,000
Total	44,540,000
(2b) Average Annual Loss by Reinsurance Layer (RMS) 100% of \$2600M XS \$2000M	25,040,000
Total	25,040,000
(2c) Selected Total Average Annual Loss	34,790,000
(3) Annual Exposure Growth	-5.0%
(4) Prospective Average Annual Loss	33,050,500
(5) Net Cost of Reinsurance	69,014,477
(6) TWIA 2017 Earned Premium at Present Rates	478,732,034
(7) 2018 - 2019 TWIA Prospective Earned Premium at Present Rates	431,390,335
(8) Indicated Reinsurance Expense %	16.0%

Notes:

- (1) From TWIA reinsurance contract effective 6/1/2018 through 5/31/2019
- (2a) Provided by Guy Carpenter, based on AIR model using TWIA exposures as of 11/30/2017 and adjusted for ALAE
- (2b) Provided by Guy Carpenter, based on RMS model using TWIA exposures as of 11/30/2017 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) = Sum of (2c) * [(3) ^ 1.000]
- (5) = (1) - (4)
- (6) = Commercial Exhibit 10, Sheet 1 + Residential Exhibit 10, Sheet 2, calendar year ending 12/31/xx
- (7) = (6) adjusted for premium trend * [(1+(3)) ^ 1.417] (projected premium growth from 7/1/2017 to 12/1/2018)
- (8) = (5) / (7)

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

Calendar Year	TWIA Provided Written Premium			Annual Statement Gross	
	Commercial	Residential	Total	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
Total	1,358,892,177	3,767,412,057	5,126,304,234	5,126,757,027	(452,793)

Notes:

- (2), (3) Provided by TWIA, as of 12/31/2017
(4) = (2) + (3)
(5) Based on TWIA Annual Statements
(6) = (4) - (5)

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Current and Proposed Rates

Territorial Multipliers for Dwellings

Construction	Territory 1			Territories 8, 9, 10		
	Current	Proposed	Change	Current	Proposed	Change
Frame	2.833	3.116	9.989%	4.456	4.901	9.987%
Brick Veneer	2.910	3.201	10.000%	4.650	5.115	10.000%
Brick	2.415	2.656	9.979%	3.860	4.246	10.000%

Territorial Multipliers for Personal Property

Construction	Territory 1			Territories 8, 9, 10		
	Current	Proposed	Change	Current	Proposed	Change
Frame	2.902	3.192	9.993%	4.565	5.021	9.989%
Brick Veneer	2.796	3.075	9.979%	4.581	5.039	9.998%
Brick	2.363	2.599	9.987%	3.770	4.147	10.000%

Territorial Multipliers for Farm and Ranch Dwellings

Construction	Territory 1			Territories 8, 9, 10		
	Current	Proposed	Change	Current	Proposed	Change
Frame	2.833	3.116	9.989%	4.456	4.901	9.987%
Brick Veneer	2.910	3.201	10.000%	4.650	5.115	10.000%
Brick	2.415	2.656	9.979%	3.860	4.246	10.000%

Territorial Multipliers for Farm and Ranch Personal Property

Construction	Territory 1			Territories 8, 9, 10		
	Current	Proposed	Change	Current	Proposed	Change
Frame	2.902	3.192	9.993%	4.565	5.021	9.989%
Brick Veneer	2.796	3.075	9.979%	4.581	5.039	9.998%
Brick	2.363	2.599	9.987%	3.770	4.147	10.000%

Modified EC Rates are calculated by multiplying promulgated base rates by a 130% flex factor and the appropriate territorial multiplier
All interim calculations are rounded down where applicable

Texas Windstorm Insurance Association
Residential Property - Wind & Hail
Rate Level Review
Current and Proposed Rates
Manufactured Homes

Rates for Manufactured Homes

	Current	Proposed	Change
Located inland of the intracoastal Waterway (MH1, MH3)	2.50	2.750	10.000%
Located seaward of the intracoastal Waterway (MH2, MH4)	5.00	5.500	10.000%



**TEXAS WINDSTORM INSURANCE ASSOCIATION
2018 RATE/RULE FILING**

PART II – RATING RULES

See attachments:

1. TWIA Rating Rules
Redline Final Version.pdf
2. TWIA Rating Rules Clean
Copy Final Version.pdf

August 2018