TEXAS WINDSTORM INSURANCE ASSOCIATION
COMMERCIAL PROPERTY RATE LEVEL REVIEW
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 commercial 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 commercial 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 11/30/2017. 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 commercial wind/hail coverage. The actual costs of providing commercial 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 commercial 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	+50%
Actual Industry Experience	+48%
Hurricane Simulation Models	+52%

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 13% more than the corresponding indication from the prior TWIA commercial 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 Pre-event Class 1 securities 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 commercial 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 TWIA written premium is adjusted to the current rate level and adjusted to an earned basis based on a uniform monthly earning assumption. 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 rates.

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 loss ratios is described in the following 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 non-hurricane loss for accident years 2009 - 2018 to the earned premium at current rates for the same ten years. The indicated ultimate non-hurricane loss for each year is based on actual 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 both the current average of all available years and the prior selection. 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, weighted average across the most recent 10 years has been selected to achieve both high stability and credibility.

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, until recently, the Texas Insurance Code required 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 commercial 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 over- or understatement of expected losses resulting from 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 13 hurricane years and 40 non-hurricane years. The 40 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 13 hurricane years. An average hurricane loss ratio for hurricane years is calculated as the average of the 13 hurricane loss ratios: 130%.

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 49.5%.

Hurricane Simulation Models

The projected hurricane loss ratio is determined by averaging two different hurricane simulation models. The model 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, Sheets 1 and 2 show a reconciliation of the TWIA premium and loss data used in this report (ratemaking data) to TWIA's annual statements. Sheet 1 reconciles paid loss data by

accident year; Sheet 2 reconciles written premium data by calendar year.

Differences between the ratemaking paid loss data and the annual statement data for all accident years were reviewed, considered explainable and therefore deemed not significant.

The written premium reconciliation shows the differences between the ratemaking written premium data and the annual statement data for calendar years 1994 - 2018. 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 7% 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
Previous Rate Indication (Combined Method)		**+37%**
Change in modeled loss ratio	+1%	
Change in outstanding bond repayment	+8%	
Change due to all other factors	+4%	
Current Rate Indication (Combined Method)		**+50%**

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 1850 - 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
Commercial Property - Wind & Hail
2019 Rate Level Review

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

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Texas Windstorm Insurance Association
Commercial Property - Wind & Hail
Rate Level Review
Summary of Indicated Rate Change
By Method for Projecting Hurricane Loss & LAE

Exhibit 1

	Indicated Loss & LAE Ratio						
Hurricane Projection Method	Hurricane	Non-Hurricane	Fixed Expenses	Total	Permissible LLAE Ratio	Indicated Rate Change	Proposed Rate Change
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Using Experience and Models	58.3%	9.3%	47.9%	115.5%	77.0%	+50%	
Using Actual Industry Experience	56.9%	9.3%	47.9%	114.1%	77.0%	+48%	
Using Hurricane Models	59.7%	9.3%	47.9%	116.9%	77.0%	+52%	

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

Texas Windstorm Insurance Association
Commercial Property - Wind & Hail
Rate Level Review
Projected Ultimate Non-Hurricane Loss & LAE Ratio

Accident Year	Ultimate Non-Hurricane Loss	LAE Factor	Net Trend Factor	Projected Non-Hurricane Loss & LAE	Earned Premium at Current Rate Level	Indicated Non-Hurricane Loss & LAE Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2009	2,553,456	0.268	1.184	3,833,534	159,214,792	2.4%
2010	7,478,289	0.268	1.219	11,559,131	151,048,188	7.7%
2011	19,217,587	0.268	1.188	28,949,066	138,891,291	20.8%
2012	14,459,642	0.268	1.173	21,506,751	137,525,969	15.6%
2013	7,395,437	0.268	1.195	11,206,010	139,160,577	8.1%
2014	1,079,519	0.268	1.167	1,597,425	129,234,128	1.2%
2015	19,128,970	0.268	1.144	27,748,331	114,980,596	24.1%
2016	2,726,125	0.268	1.141	3,944,125	100,738,792	3.9%
2017	2,249,852	0.268	1.113	3,175,180	83,489,580	3.8%
2018	226,519	0.268	1.067	306,470	69,991,684	0.4%
Total	76,515,396			113,826,023	1,224,275,597	9.3%

Notes:

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

Texas Windstorm Insurance Association
Commercial Property - Wind & Hail
Rate Level Review
Projected Ultimate Non-Hurricane Loss

Accident Year	TWIA Non-Hurricane Paid Loss	Development Factor	Ultimate Non-Hurricane Loss
(1)	(2)	(3)	(4)
2009	2,553,456	1.000	2,553,456
2010	7,478,289	1.000	7,478,289
2011	19,217,587	1.000	19,217,587
2012	14,459,642	1.000	14,459,642
2013	7,351,329	1.006	7,395,437
2014	1,056,281	1.022	1,079,519
2015	18,644,220	1.026	19,128,970
2016	2,584,005	1.055	2,726,125
2017	1,963,222	1.146	2,249,852
2018	164,741	1.375	226,519
Total	75,472,772		76,515,396

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

Texas Windstorm Insurance Association
Commercial Property - Wind & Hail
Rate Level Review
Summary of TWIA Historical Paid Loss as of 12/31/18

Accident Year	Paid Loss Excluding Expense Non-Hurricane	Hurricane	Total
(1)	(2)	(3)	(4)
2009	2,553,456	0	2,553,456
2010	7,478,289	0	7,478,289
2011	19,217,587	0	19,217,587
2012	14,459,642	0	14,459,642
2013	7,351,329	0	7,351,329
2014	1,056,281	0	1,056,281
2015	18,644,220	0	18,644,220
2016	2,584,005	0	2,584,005
2017	1,963,222	384,209,207	386,172,429
2018	164,741	0	164,741
Total	75,472,772	384,209,207	459,681,979

Notes:
(2), (3) Provided by TWIA, includes commercial and farm
(4) = (2) + (3)

Texas Windstorm Insurance Association
Commercial 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 / 4	3,986.26
2011 / 4	4,002.39
2012 / 4	4,097.53
2013 / 4	4,252.75
2014 / 4	4,282.15
2015 / 4	4,264.40
2016 / 4	4,252.60
2017 / 4	4,215.24
2018 / 4	4,176.71

(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	-0.8%
(9) Selected Loss Trend	1.8%

Accident Year	Current Premium Trend	Current Loss Trend	Prospective Premium Trend	Prospective Loss Trend	Net Trend Factor
(10)	(11)	(12)	(13)	(14)	(15)
2009	1.048	1.163	0.980	1.046	1.184
2010	1.048	1.197	0.980	1.046	1.219
2011	1.044	1.162	0.980	1.046	1.188
2012	1.019	1.121	0.980	1.046	1.173
2013	0.982	1.100	0.980	1.046	1.195
2014	0.975	1.067	0.980	1.046	1.167
2015	0.979	1.050	0.980	1.046	1.144
2016	0.982	1.051	0.980	1.046	1.141
2017	0.991	1.034	0.980	1.046	1.113
2018	1.000	1.000	0.980	1.046	1.067

Notes:

(2) Exhibit 3, Sheet 2 (7)
(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 / 4
(12) Exhibit 3, Sheet 3a
(13) = [1 + (8)] ^ (6)
(14) = [1 + (9)] ^ (7)
(15) = [(12) * (14)] / [(11) * (13)]

Texas Windstorm Insurance Association
Commercial Property - Wind & Hail
Rate Level Review
Paid Loss Development Factors
TWIA Commercial Property Paid Loss

Months of Development

Accident Year	12	24	36	48	60	72	84
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2009	706	2,289	2,553	2,553	2,553	2,553	2,553
2010	4,489	6,162	6,783	7,280	7,280	7,302	7,478
2011	13,360	16,138	18,435	18,758	19,119	19,200	19,218
2012	8,512	11,404	13,135	13,284	13,309	14460	14,460
2013	6,886	7,243	7,338	7,351	7351	7,351	
2014	641	875	1,015	1056	1,056		
2015	15,923	17,690	17780	18,644			
2016	2,055	2479	2,584				
2017	1,599	1,963					
2018	165						

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	3.241	1.115	1.000	1.000	1.000	1.000	
2010	1.373	1.101	1.073	1.000	1.003	1.024	
2011	1.208	1.142	1.018	1.019	1.004	1.001	
2012	1.340	1.152	1.011	1.002	1.086	1.000	
2013	1.052	1.013	1.002	1.000	1.000		
2014	1.365	1.160	1.040	1.000			
2015	1.111	1.005	1.049				
2016	1.206	1.042					
2017	1.228						
Average	1.458	1.091	1.028	1.004	1.019	1.006	
Avg x hi / lo	1.261	1.094	1.024	1.000	1.002	1.000	
Avg 3 Year	1.182	1.069	1.030	1.001	1.030	1.008	
Avg 5 Year	1.192	1.074	1.024	1.004	1.019	1.006	
Prior	1.200	1.081	1.029	1.003	1.012	1.006	1.000
Selected	1.200	1.086	1.029	1.003	1.016	1.006	1.000
Cumulative	1.375	1.146	1.055	1.026	1.022	1.006	1.000

Notes:
Provided by TWIA, includes commercial and farm,
excludes hurricanes Brett (1999), Claudette (2003), Rita (2005), Humberto (2007), Dolly (2008), and Ike (2008), Harvey (2017)

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

Year / Quarter	Exposure Written	Written Premium	On-Level Factors	Written Premium at Present Rates Written	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	11,220	31,841,452	1.407	44,804,121	3,993					
2009 / 3	11,788	35,544,214	1.407	50,014,279	4,243					
2009 / 4	9,742	24,176,074	1.407	34,018,164	3,492					
2010 / 1	7,811	23,376,688	1.407	32,893,348	4,211	3,987	4,007			
2010 / 2	10,820	34,131,354	1.407	48,026,243	4,439	4,107	4,015			
2010 / 3	11,668	31,767,550	1.407	44,700,133	3,831	3,987	4,023			
2010 / 4	8,548	20,776,517	1.407	29,234,646	3,420	3,986	4,032			
2011 / 1	6,214	19,850,492	1.340	26,601,558	4,281	3,988	4,040			
2011 / 2	9,658	29,228,333	1.340	39,168,762	4,056	3,871	4,049			
2011 / 3	10,928	31,567,447	1.340	42,303,398	3,871	3,884	4,057			
2011 / 4	7,912	23,026,165	1.340	30,857,263	3,900	4,002	4,065			
2012 / 1	7,909	24,771,378	1.276	31,615,253	3,997	3,954	4,074			
2012 / 2	9,232	32,088,566	1.276	40,954,045	4,436	4,050	4,082			
2012 / 3	10,836	32,876,434	1.276	41,959,587	3,872	4,051	4,091			
2012 / 4	7,698	24,799,106	1.276	31,650,642	4,112	4,098	4,099			
2013 / 1	7,144	24,974,712	1.216	30,356,919	4,249	4,151	4,108			
2013 / 2	9,194	32,706,056	1.216	39,754,415	4,324	4,121	4,116			
2013 / 3	10,002	35,220,808	1.216	42,811,112	4,280	4,247	4,125			
2013 / 4	7,133	24,211,988	1.216	29,429,823	4,126	4,253	4,133			
2014 / 1	6,329	23,028,882	1.158	26,658,810	4,212	4,246	4,142	4,306.89		
2014 / 2	8,964	35,219,745	1.158	40,771,257	4,548	4,307	4,151	4,300.37		
2014 / 3	8,292	29,887,118	1.158	34,598,075	4,172	4,280	4,159	4,293.86		
2014 / 4	6,088	21,627,063	1.158	25,036,029	4,112	4,282	4,168	4,287.36		
2015 / 1	6,464	24,808,373	1.103	27,351,231	4,231	4,286	4,177	4,280.86	4,303.54	
2015 / 2	7,870	33,339,199	1.103	36,756,467	4,670	4,309	4,185	4,274.38	4,294.61	
2015 / 3	7,657	28,055,666	1.103	30,931,372	4,040	4,276	4,194	4,267.91	4,285.71	
2015 / 4	4,802	17,430,504	1.103	19,217,131	4,002	4,264	4,203	4,261.44	4,276.82	
2016 / 1	5,512	22,487,925	1.050	23,612,321	4,284	4,277	4,211	4,254.99	4,267.96	4,277.37
2016 / 2	6,522	28,623,450	1.050	30,054,623	4,608	4,239	4,220	4,248.55	4,259.11	4,267.16
2016 / 3	6,507	25,417,054	1.050	26,687,907	4,101	4,266	4,229	4,242.11	4,250.28	4,256.98
2016 / 4	4,047	14,955,154	1.050	15,702,912	3,880	4,253	4,238	4,235.69	4,241.46	4,246.82
2017 / 1	4,263	17,482,209	1.050	18,356,319	4,306	4,255	4,247	4,229.27	4,232.67	4,236.69
2017 / 2	5,717	25,224,489	1.050	26,485,713	4,633	4,248	4,255	4,222.87	4,223.89	4,226.58
2017 / 3	5,172	19,050,031	1.050	20,002,533	3,867	4,195	4,264	4,216.47	4,215.14	4,216.49
2017 / 4	3,489	13,077,837	1.050	13,731,729	3,936	4,215	4,273	4,210.09	4,206.40	4,206.43
2018 / 1	3,663	15,807,970	1.000	15,807,970	4,316	4,214	4,282	4,203.71	4,197.67	4,196.39
2018 / 2	5,108	22,862,777	1.000	22,862,777	4,476	4,154	4,291	4,197.35	4,188.97	4,186.38
2018 / 3	4,612	17,927,115	1.000	17,927,115	3,887	4,168	4,300	4,190.99	4,180.29	4,176.39
2018 / 4	3,109	12,284,401	1.000	12,284,401	3,951	4,177	4,309	4,184.64	4,171.62	4,166.42
(14) Average Annual Change							0.8%	-0.6%	-0.8%	-1.0%
(15) Correlation Coefficient							37.0%	71.1%	84.2%	79.1%
(16) Selected Premium Trend										-0.8%

Notes:
(2) Provided by TWIA
(3) Provided by TWIA
(4) Factor to bring written premium to current rate level
(5) = (3) * (4) Indexed to 2018 / 4
(6) = (5) / (2)
(7) annualized average written premium
(8) - (11) 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
Commercial Property - Wind & Hail
Rate Level Review
Loss Trend Analysis
Summary of Indices and Calculation of Prospective Loss Costs

Calendar Year Ending 12/31/xx	Commercial Statewide Boeckh	Commercial Coastal Boeckh	Residential Statewide Boeckh	Residential Coastal Boeckh	Modified CPI	Weighted Average
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2009	1.198	1.184	1.193	1.189	1.098	1.163
2010	1.220	1.230	1.186	1.192	1.098	1.197
2011	1.178	1.189	1.172	1.184	1.081	1.162
2012	1.135	1.141	1.141	1.153	1.061	1.121
2013	1.111	1.115	1.108	1.120	1.055	1.100
2014	1.079	1.075	1.073	1.074	1.041	1.067
2015	1.059	1.057	1.052	1.058	1.030	1.050
2016	1.064	1.063	1.063	1.069	1.014	1.051
2017	1.041	1.042	1.042	1.046	1.011	1.034
2018	1.000	1.000	1.000	1.000	1.000	1.000
Factors to Adjust For Prospective Loss Costs						
(8) Fitted Trend	2.2%	2.1%	1.4%	1.4%	1.1%	1.8%
(9) Cost Factor	1.056	1.053	1.035	1.036	1.027	1.046

Notes:
(2) = Exhibit 3, Sheet 3b trended forward to 12/31/2018
(3) = Exhibit 3, Sheet 3c trended forward to 12/31/2018
(4) = Residential Exhibit 3, Sheet 3b trended forward to 12/31/2018
(5) = Residential Exhibit 3, Sheet 3c trended forward to 12/31/2018
(6) = Exhibit 3, Sheet 3d
(7) = 25% CPI and 75% Boeckh (most appropriate available by year)
(8) = (2) - (7) fitted to an exponential curve using 5 years' data (where available)
(9) = [1 + (8)] ^ 2.5 (trended from 7/1/2018 to 1/1/2021)

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

Calendar Year Ending	Texas Statewide Index	Fitted Trends All Years Linear	Exponential
(1)	(2)	(3)	(4)
3/31/2009	2108.32		
6/30/2009	2141.00		
9/30/2009	2157.97		
12/31/2009	2155.18		
3/31/2010	2141.73		
6/30/2010	2124.68		
9/30/2010	2115.34		
12/31/2010	2116.48	2156.32	2160.13
3/31/2011	2127.08	2168.96	2171.84
6/30/2011	2141.50	2181.60	2183.62
9/30/2011	2163.68	2194.25	2195.45
12/31/2011	2192.00	2206.89	2207.36
3/31/2012	2217.77	2219.53	2219.32
6/30/2012	2239.55	2232.17	2231.36
9/30/2012	2258.47	2244.82	2243.45
12/31/2012	2275.37	2257.46	2255.62
3/31/2013	2288.71	2270.10	2267.84
6/30/2013	2300.16	2282.75	2280.14
9/30/2013	2312.55	2295.39	2292.50
12/31/2013	2324.29	2308.03	2304.93
3/31/2014	2338.66	2320.68	2317.43
6/30/2014	2357.74	2333.32	2329.99
9/30/2014	2375.53	2345.96	2342.62
12/31/2014	2394.51	2358.61	2355.32
3/31/2015	2413.17	2371.25	2368.09
6/30/2015	2425.58	2383.89	2380.93
9/30/2015	2434.16	2396.53	2393.84
12/31/2015	2437.78	2409.18	2406.82
3/31/2016	2435.64	2421.82	2419.87
6/30/2016	2430.75	2434.46	2432.99
9/30/2016	2426.85	2447.11	2446.18
12/31/2016	2426.13	2459.75	2459.44
3/31/2017	2432.15	2472.39	2472.77
6/30/2017	2445.14	2485.04	2486.18
9/30/2017	2463.09	2497.68	2499.66
12/31/2017	2480.92	2510.32	2513.21
3/31/2018	2500.44	2522.97	2526.84
6/30/2018	2524.05	2535.61	2540.53
9/30/2018	2551.48	2548.25	2554.31
12/31/2018	2582.60	2560.89	2568.16
Annual Trend		2.0%	2.2%
R-Squared		0.951	0.944

Notes:
(2) = Average Index for Austin, Corpus Christi, Dallas, El Paso, Fort Worth, Houston, Odessa, and San Antonio
(3) - (4) = (2) fitted to linear and exponential distributions

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

Calendar Year Ending	Texas Coastal Index	Fitted Trends All Years Linear	Exponential
(1)	(2)	(3)	(4)
3/31/2007			
6/30/2007			
9/30/2007			
12/31/2007			
3/31/2008			
6/30/2008			
9/30/2008			
12/31/2008	2114.71	2097.71	2105.07
3/31/2009	2145.16	2109.70	2115.91
6/30/2009	2180.12	2121.70	2126.81
9/30/2009	2204.40	2133.69	2137.77
12/31/2009	2204.50	2145.68	2148.79
3/31/2010	2186.90	2157.68	2159.86
6/30/2010	2162.64	2169.67	2170.99
9/30/2010	2138.17	2181.67	2182.17
12/31/2010	2121.49	2193.66	2193.41
3/31/2011	2123.27	2205.65	2204.72
6/30/2011	2135.31	2217.65	2216.07
9/30/2011	2160.02	2229.64	2227.49
12/31/2011	2194.60	2241.63	2238.97
3/31/2012	2222.30	2253.63	2250.50
6/30/2012	2245.64	2265.62	2262.10
9/30/2012	2266.95	2277.62	2273.76
12/31/2012	2288.14	2289.61	2285.47
3/31/2013	2305.89	2301.60	2297.25
6/30/2013	2318.32	2313.60	2309.08
9/30/2013	2329.99	2325.59	2320.98
12/31/2013	2341.89	2337.58	2332.94
3/31/2014	2362.28	2349.58	2344.96
6/30/2014	2386.51	2361.57	2357.04
9/30/2014	2407.30	2373.57	2369.18
12/31/2014	2428.32	2385.56	2381.39
3/31/2015	2443.32	2397.55	2393.66
6/30/2015	2455.44	2409.55	2405.99
9/30/2015	2464.89	2421.54	2418.39
12/31/2015	2470.01	2433.53	2430.85
3/31/2016	2469.65	2445.53	2443.37
6/30/2016	2465.77	2457.52	2455.96
9/30/2016	2460.52	2469.51	2468.62
12/31/2016	2456.69	2481.51	2481.34
3/31/2017	2459.24	2493.50	2494.12
6/30/2017	2470.50	2505.50	2506.97
9/30/2017	2486.09	2517.49	2519.89
12/31/2017	2504.97	2529.48	2532.87
3/31/2018	2524.58	2541.48	2545.92
6/30/2018	2547.98	2553.47	2559.04
9/30/2018	2576.19	2565.46	2572.22
12/31/2018	2610.28	2577.46	2585.48
Annual Trend		1.9%	2.1%
R-Squared		0.931	0.927

Notes:
(2) = Average Index for Corpus Christi and Houston
(3) - (4) = (2) fitted to linear and exponential distributions

Texas Windstorm Insurance Association
Commercial 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
Commercial 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
Commercial 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			12911
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
Commercial 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	1.044	0.986	1.000	0.999	0.998	0.995	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
Commercial Property - Wind & Hail
Rate Level Review
Ultimate LAE (TWIA All Lines)

Accident Year	Incurred ALAE at 12/31/18	Development Factor	Indicated Ultimate DCC	Incurred AAO	Incurred LAE
(1)	(2)	(3)	(4)	(5)	(6)
1980					1318
1981					543
1982					565
1983					9,127
1984					324
1985					297
1986			270	235	505
1987			652	404	1,056
1988			235	122	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
Commercial Property - Wind & Hail
Rate Level Review
Incurred ALAE Development Factors
TWIA Schedule P Incurred DCC (Including IBNR)

Accident Year	Months of Development 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						

Accident Year	Development Factors 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	2.81	1.11	1.11	1.03	0.98	1.01	
Avg x hi / lo	1.20	1.02	1.08	0.99	0.98	1.01	
Avg 3 Year	7.34	1.53	1.29	1.07	1.04	1.00	
Avg 5 Year	4.80	1.31	1.17	1.04	1.02	1.00	
Prior	1.15	1.03	1.10	1.06	0.99	1.03	1.00
Selected	1.15	1.03	1.15	1.04	1.00	1.01	1.00
Cumulative	1.43	1.24	1.20	1.05	1.01	1.01	1.00

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

Exhibit 5

Basis for Hurricane Loss Ratio	Indicated Loss Ratio	LAE Factor	Indicated Loss & LAE Ratio
(1)	(2)	(3)	(4)
Industry Experience	49.5%	0.150	56.9%
Hurricane Models			
AIR Model	53.3%	0.150	61.3%
RMS Model	50.5%	0.150	58.1%
Average of Models	51.9%	0.150	59.7%

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

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

Accident Year	Earned Premium at Current TWIA Rate Level	Incurred Loss Ratio
(1)	(2)	(3)
1970	58,356,336	39.6%
1971	63,040,303	88.7%
1980	70,042,582	54.9%
1983	41,090,972	343.3%
1986	52,951,602	7.8%
1989	83,916,652	6.1%
1990	71,387,141	91.2%
1999	167,478,166	8.5%
2003	200,309,387	22.6%
2005	252,973,058	177.1%
2007	330,332,938	15.5%
2008	297,781,052	464.8%
2017	197,292,529	464.7%

(4)	Simple Average Loss Ratio for Hurricane Years	137.3%	
(5)	Selected Non-Hurricane Loss Ratio	7.3%	
(6)	Average Hurricane Loss Ratio for Hurricane Years	130.0%	
(7)	Historical Hurricane Frequency		
	(a) 53.0-Year (1/1/1966 - 12/31/2018)	0.283	(1 Hurricane Every 3.5 years)
	(b) 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	49.5%	

Notes:
(2) Exhibit 6, Sheet 2. 1999 year ending 12/31/99; all other accident years ending 9/30/xx
(3) Exhibit 6, Sheet 2. 1999 year ending 12/31/99; all other 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
Commercial Property - Wind & Hail
Rate Level Review
Industry Experience -- Commercial Extended Coverage
1967 - 2018

Accident Year	Earned Premium	Earned Premium at 1992 CMR	Earned Premium at Current Rates	Incurred Losses	Incurred Loss Ratio	Hurricane Indicator
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1970	10,874,210	18,835,352	58,356,336	23,092,142	39.6%	H
1971	13,340,143	20,347,170	63,040,303	55,893,676	88.7%	H
1972	18,906,678	24,314,307	75,331,423	8,704,522	11.6%	
1973	21,737,541	23,257,532	72,057,286	3,837,493	5.3%	
1974	22,348,193	22,844,661	70,778,115	2,193,087	3.1%	
1975	24,396,629	24,958,305	77,326,680	3,943,412	5.1%	
1976	26,795,934	24,109,943	74,698,255	2,218,115	3.0%	
1977	30,910,821	27,119,226	84,021,720	1,898,346	2.3%	
1978	32,709,599	26,415,338	81,840,910	2,535,872	3.1%	
1979	31,306,685	24,514,306	75,951,067	4,535,147	6.0%	
1980	28,751,765	22,607,257	70,042,582	38,431,071	54.9%	H
1981	24,129,384	21,398,588	66,297,842	4,272,728	6.4%	
1982	18,505,004	17,523,231	54,291,078		3.4%	
1983	12,680,397	13,262,706	41,090,972		343.3%	H
1984	12,736,031	14,992,627	46,450,673		7.6%	
1985	15,169,575	16,422,895	50,881,979		3.7%	
1986	21,130,682	17,090,896	52,951,602		7.8%	H
1987	31,114,529	26,771,157	82,943,320		1.4%	
1988	25,065,531	24,117,319	74,721,108		8.3%	
1989	24,167,085	27,085,314	83,916,652		6.1%	H
1990	19,677,404	23,041,233	71,387,141		91.2%	H
1991	21,794,680	25,534,881	79,113,047		52.6%	
1992	23,737,753	26,950,473	83,498,883		1.4%	
1993	21,990,182		68,125,584		6.1%	
1994	16,604,950		51,442,134		8.9%	
1995	32,374,229		100,295,361		20.4%	
1996	55,367,089		171,527,241		2.5%	
1997	53,196,024		164,801,282		3.9%	
1998	53,986,058		169,786,152		15.3%	
1999	52,435,243		167,478,166		8.5%	H
2000	41,739,697		127,598,253		7.2%	
2001	42,330,042		121,614,211		5.8%	
2002	69,156,402		190,110,949		14.2%	
2003	78,368,305		200,309,387		22.6%	H
2004	112,957,791		262,400,948		2.0%	
2005	119,598,806		252,973,058		177.1%	H
2006	148,019,940		287,762,390		2.2%	
2007	186,207,969		330,332,938		15.5%	H
2008	177,673,659		297,781,052		464.8%	H
2009	185,204,697		282,807,572		2.7%	
2010	192,438,623		270,761,142		4.0%	
2011	186,308,587		255,801,690		16.2%	
2012	204,502,811		267,285,174		18.6%	
2013	226,257,696		281,690,832		6.7%	
2014	236,800,664		280,845,588		1.2%	
2015	229,375,125		258,964,516		14.9%	
2016	212,604,889		228,762,860		4.1%	
2017	187,897,646		197,292,529		464.7%	H
2018	183,624,326		188,031,309		1.7%	
Total / Average	3,819,007,703		7,067,571,294		42.2%	
Average of Non-Hurricane Years					7.9%	
Average of Non-Hurricane Years Excluding 1991					6.6%	
Selected					7.3%	

Notes: (2) Provided by TDI. 1970 - 1995 are year ending 9/30/xx as of Evaluated as of; 1996 - 2018 are year ending 12/31/xx as of 12/31/18
(3) Provided by TDI (1992 MR = 1992 manual rates)
(4) 1993 - 2018: Sum of Exhibit 6, Sheet 4 - Sheet 7, (5); 1970 - 1992: (3) * 3.098,factor to bring industry premium to TWIA curr't rate level
(5) Provided by TDI. 1970 - 1981 are year ending 9/30/xx as of 12/31/99; 1982 - 2018 are year ending 12/31/xx as of 12/31/18
(6) 1983 - 2018: Exhibit 6, Sheet 3; 1970 - 1982: (5) / (4)
(7) "H" indicates occurrence of hurricane(s) during the time period (years ending 12/31/xx)

Industry Experience -- Commercial Extended Coverage

Loss Ratios by Territory / Tier

Accident Year	Territory 8	Territory 9	Territory 10	Tier 2	Weighted Loss Ratio	Devel't Wtd Loss Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1983	878.7%	3.8%	40.9%	147.2%	343.3%	343.3%
1984	7.5%	3.8%	9.7%	14.1%	7.6%	7.6%
1985	3.7%	2.5%	4.3%	7.9%	3.7%	3.7%
1986	2.9%	1.0%	15.9%	12.4%	7.8%	7.8%
1987	0.5%	1.6%	2.0%	3.0%	1.4%	1.4%
1988	11.5%	3.4%	8.1%	4.7%	8.3%	8.3%
1989	13.3%	1.7%	1.9%	5.4%	6.1%	6.1%
1990	235.5%	2.5%	8.8%	6.8%	91.2%	91.2%
1991	21.3%	21.0%	99.9%	4.6%	52.6%	52.6%
1992	0.7%	1.0%	2.1%	3.8%	1.4%	1.4%
1993	13.5%	1.7%	1.7%	5.7%	6.1%	6.1%
1994	0.3%	3.7%	19.6%	7.9%	8.9%	8.9%
1995	7.8%	10.3%	37.6%	20.6%	20.4%	20.4%
1996	1.5%	2.9%	3.1%	6.6%	2.5%	2.5%
1997	5.2%	2.0%	3.6%	9.0%	3.9%	3.9%
1998	20.7%	13.7%	11.4%	9.0%	15.3%	15.3%
1999	2.7%	12.6%	11.7%	8.9%	8.5%	8.5%
2000	2.1%	2.0%	13.8%	58.9%	7.2%	7.2%
2001	7.0%	3.2%	5.7%	28.7%	5.8%	5.8%
2002	11.7%	31.3%	7.2%	9.6%	14.2%	14.2%
2003	2.4%	8.4%	49.0%	31.1%	22.6%	22.6%
2004	2.9%	0.6%	2.0%	3.1%	2.0%	2.0%
2005	66.6%	1.7%	378.2%	50.9%	177.1%	177.1%
2006	2.3%	1.0%	2.6%	5.8%	2.2%	2.2%
2007	1.6%	56.4%	5.9%	9.9%	15.5%	15.5%
2008	700.9%	36.5%	483.0%	490.2%	464.8%	464.8%
2009	2.5%	4.7%	1.6%	9.6%	2.7%	2.7%
2010	1.5%	4.6%	6.1%	3.4%	4.0%	4.0%
2011	3.9%	31.1%	19.2%	18.9%	16.2%	16.2%
2012	19.0%	24.3%	15.3%	10.9%	18.6%	18.6%
2013	14.2%	4.3%	1.2%	7.3%	6.7%	6.7%
2014	0.6%	2.4%	1.1%	4.6%	1.2%	1.2%
2015	12.1%	4.5%	22.2%	14.2%	14.5%	14.9%
2016	0.9%	8.2%	3.8%	31.2%	3.9%	4.1%
2017	67.1%	1104.2%	429.5%	130.8%	442.6%	464.7%
2018	0.5%	1.2%	1.6%	18.8%	1.2%	1.7%
Average	59.6%	39.4%	48.1%	33.8%	50.3%	51.0%

TWIA 2018 Written Premium by Territory / Tier

		Territory 8	Territory 9	Territory 10	Tier 2	Total
(8)	Amount	25,650,931	15,358,843	27,829,516	526,533	69,365,823
(9)	% Share	36.98%	22.14%	40.12%	0.76%	100.00%

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 development factors from Exhibit 2.2
(8) Provided by TWIA
(9) = (8) / (8) Total

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

Accident Year	Earned Premium	Earned Premium at 1992 MR	TWIA Factor to Current Rate Level	Earned Premium at Current Rates	Incurred Loss	Incurred Loss Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1983	913,865	968,224	3.098	2,999,558	26,357,425	878.7%
1984	1,195,339	1,366,667	3.098	4,233,934	318,455	7.5%
1985	2,581,481	2,777,593	3.098	8,604,983	314,878	3.7%
1986	3,013,362	2,349,181	3.098	7,277,763	211,282	2.9%
1987	3,004,153	2,585,122	3.098	8,008,708	37,480	0.5%
1988	2,905,355	2,728,206	3.098	8,451,982	969,836	11.5%
1989	2,825,114	3,015,974	3.098	9,343,487	1,244,199	13.3%
1990	2,303,321	2,474,141	3.098	7,664,889	18,053,460	235.5%
1991	2,203,500	2,080,579	3.098	6,445,634	1,371,244	21.3%
1992	2,352,391	2,012,473	3.098	6,234,641	46,331	0.7%
1993	2,406,016		3.098	7,453,838	1,005,945	13.5%
1994	2,807,090		3.098	8,696,365	28,034	0.3%
1995	2,645,757		3.098	8,196,555	635,625	7.8%
1996	5,519,716		3.098	17,100,080	249,644	1.5%
1997	5,461,636		3.098	16,920,148	886,485	5.2%
1998	6,133,105		3.145	19,288,615	3,994,564	20.7%
1999	6,706,028		3.194	21,419,053	575,316	2.7%
2000	4,997,201		3.057	15,276,443	320,131	2.1%
2001	4,785,262		2.873	13,748,058	962,576	7.0%
2002	8,206,069		2.749	22,558,484	2,632,325	11.7%
2003	8,793,047		2.556	22,475,028	529,845	2.4%
2004	12,425,339		2.323	28,864,062	830,387	2.9%
2005	13,839,253		2.112	29,228,502	19,469,845	66.6%
2006	18,414,310		1.958	36,055,219	812,370	2.3%
2007	24,924,710		1.774	44,216,436	710,669	1.6%
2008	24,970,117		1.676	41,849,916	293,310,706	700.9%
2009	29,363,002		1.527	44,837,304	1,140,669	2.5%
2010	31,702,630		1.407	44,605,600	669,882	1.5%
2011	31,272,385		1.373	42,936,985	1,675,264	3.9%
2012	35,126,663		1.307	45,910,549	8,709,842	19.0%
2013	37,667,656		1.245	46,896,232	6,670,061	14.2%
2014	38,291,181		1.186	45,413,341	258,179	0.6%
2015	36,812,479		1.129	41,561,289	5,022,267	12.1%
2016	36,198,819		1.076	38,949,929	334,194	0.9%
2017	33,019,317		1.050	34,670,283	23,262,415	67.1%
2018	31,415,090		1.024	32,169,052	148,796	0.5%
Total	517,201,759			840,562,945	423,770,626	50.4%

Notes:

(2) Provided by TDI. 1983 - 1995 are year ending 9/30/xx as of 12/31/99; 1996 - 2018 are year ending 12/31/xx as of 12/31/18
(3) Provided by TDI (1992 MR = 1992 manual rates)
(4) Represents 1/1/98 through 1/1/18 rate changes for TWIA; factors assume uniform earning of written premium and that TWIA premium represents 88.8% of industry data in Tier 1 -- Territory 8
(5) = (3) * (4) for 1983 - 1992; (2) * (4) for 1993 - 2018
(6) Provided by TDI. 1983 - 1995 are year ending 9/30/xx as of 12/31/99; 1996 - 2008 are year ending 12/31/xx as of 12/31/17 2009 - 2018 are year ending 12/31/xx as of 12/31/2018; 2008 IKE incurred loss was adjusted down by $99,433,917
(7) = (6) / (5)

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

Accident Year	Earned Premium	Earned Premium at 1992 MR	TWIA Factor to Current Rate Level	Earned Premium at Current Rates	Incurred Loss	Incurred Loss Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1983	745,985	820,826	3.098	2,542,919	96,051	3.8%
1984	558,639	652,809	3.098	2,022,402	76,481	3.8%
1985	1,235,059	1,383,103	3.098	4,284,853	106,148	2.5%
1986	2,228,911	1,849,840	3.098	5,730,804	56,387	1.0%
1987	2,381,538	2,086,940	3.098	6,465,340	105,275	1.6%
1988	1,796,653	1,719,227	3.098	5,326,165	181,414	3.4%
1989	1,632,453	1,826,430	3.098	5,658,280	98,116	1.7%
1990	1,429,526	1,769,972	3.098	5,483,373	135,678	2.5%
1991	1,390,109	1,555,310	3.098	4,818,350	1,013,636	21.0%
1992	1,571,433	1,629,721	3.098	5,048,876	49,512	1.0%
1993	1,587,772		3.098	4,918,918	86,000	1.7%
1994	2,203,514		3.098	6,826,486	254,088	3.7%
1995	2,669,951		3.098	8,271,508	854,753	10.3%
1996	5,639,923		3.098	17,472,481	502,177	2.9%
1997	3,183,758		3.098	9,863,282	199,390	2.0%
1998	3,613,310		3.145	11,363,860	1,561,275	13.7%
1999	6,808,428		3.194	21,746,119	2,735,082	12.6%
2000	5,167,158		3.057	15,796,002	317,804	2.0%
2001	4,763,324		2.873	13,685,030	431,244	3.2%
2002	8,479,915		2.749	23,311,286	7,300,265	31.3%
2003	9,934,549		2.556	25,392,707	2,122,879	8.4%
2004	14,597,450		2.323	33,909,876	212,644	0.6%
2005	16,137,249		2.112	34,081,870	566,758	1.7%
2006	21,249,313		1.958	41,606,155	434,362	1.0%
2007	27,752,523		1.774	49,232,976	27,752,523	56.4%
2008	27,990,909		1.676	46,912,763	17,103,924	36.5%
2009	29,085,395		1.527	44,413,398	2,074,340	4.7%
2010	27,312,652		1.407	38,428,901	1,768,194	4.6%
2011	24,704,656		1.373	33,919,493	10,534,288	31.1%
2012	26,050,123		1.307	34,047,511	8,260,210	24.3%
2013	27,637,008		1.245	34,408,075	1,473,733	4.3%
2014	27,448,076		1.186	32,553,418	766,708	2.4%
2015	26,022,455		1.129	29,379,352	1,323,614	4.5%
2016	22,165,422		1.076	23,849,994	1,964,437	8.2%
2017	18,980,915		1.050	19,929,961	220,070,408	1104.2%
2018	17,672,846		1.024	18,096,994	213,537	1.2%
Total	423,828,900			720,799,778	312,803,335	43.4%

Notes:

(2) Provided by TDI. 1983 - 1995 are year ending 9/30/xx as of 12/31/99; 1996 - 2017 are year ending 1/0/xx as of 12/31/17
(3) Provided by TDI (1992 MR = 1992 manual rates)
(4) Represents 1/1/98 through 1/1/18 rate changes for TWIA; factors assume uniform earning of written premium and that TWIA premium represents 89.2% of industry data in Tier 1 -- Territory 9
(5) = (3) * (4) for 1983 - 1992; (2) * (4) for 1993 - 2018
(6) Provided by TDI. 1983 - 1995 are year ending 9/30/xx as of 12/31/99; 1996 - 2008 are year ending 12/31/xx as of 12/31/17 2009 - 2018 are year ending 12/31/xx as of 12/31/2018
(7) = (6) / (5)

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

Accident Year	Earned Premium	Earned Premium at 1992 MR	TWIA Factor to Current Rate Level	Earned Premium at Current Rates	Incurred Loss	Incurred Loss Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1983	3,769,988	4,139,464	3.098	12,824,059	5,242,728	40.9%
1984	4,835,650	5,883,059	3.098	18,225,717	1,759,233	9.7%
1985	3,637,366	3,997,227	3.098	12,383,409	534,724	4.3%
1986	4,787,352	3,948,102	3.098	12,231,220	1,943,819	15.9%
1987	5,996,981	5,352,970	3.098	16,583,501	338,938	2.0%
1988	5,872,305	5,768,621	3.098	17,871,188	1,442,599	8.1%
1989	5,125,436	5,918,163	3.098	18,334,469	349,413	1.9%
1990	3,842,130	4,624,825	3.098	14,327,708	1,263,817	8.8%
1991	4,253,902	4,765,878	3.098	14,764,690	14,752,702	99.9%
1992	4,034,147	4,187,015	3.098	12,971,372	276,158	2.1%
1993	4,540,606		3.098	14,066,797	245,603	1.7%
1994	5,145,260		3.098	15,940,015	3,130,886	19.6%
1995	9,324,050		3.098	28,885,907	10,852,486	37.6%
1996	15,331,047		3.098	47,495,584	1,478,175	3.1%
1997	17,116,368		3.098	53,026,508	1,911,482	3.6%
1998	17,623,413		3.145	55,425,634	6,340,723	11.4%
1999	15,019,386		3.194	47,971,919	5,614,569	11.7%
2000	11,756,138		3.057	35,938,514	4,969,254	13.8%
2001	11,140,104		2.873	32,005,519	1,824,700	5.7%
2002	20,528,832		2.749	56,433,759	4,053,342	7.2%
2003	23,885,668		2.556	61,051,767	29,908,218	49.0%
2004	31,412,192		2.323	72,970,522	1,462,655	2.0%
2005	34,104,704		2.112	72,029,135	272,418,664	378.2%
2006	46,246,638		1.958	90,550,917	2,315,133	2.6%
2007	71,922,575		1.774	127,590,648	7,479,422	5.9%
2008	66,558,177		1.676	111,551,505	538,764,477	483.0%
2009	64,583,344		1.527	98,618,766	1,576,316	1.6%
2010	63,193,636		1.407	88,913,446	5,418,624	6.1%
2011	61,496,296		1.373	84,434,414	16,245,334	19.2%
2012	66,730,115		1.307	87,216,260	13,373,921	15.3%
2013	71,999,970		1.245	89,639,963	1,108,700	1.2%
2014	67,421,762		1.186	79,962,210	908,975	1.1%
2015	61,735,174		1.129	69,699,011	15,485,267	22.2%
2016	56,479,197		1.076	60,771,616	2,286,047	3.8%
2017	46,087,983		1.050	48,392,382	207,827,234	429.5%
2018	41,901,972		1.024	42,907,619	701,124	1.6%
Total	1,049,439,864			1,824,007,670	1,185,605,462	65.0%

Notes:

(2) Provided by TDI. 1983 - 1995 are year ending 9/30/xx as of 12/31/99; 1996 - 2017 are year ending 12/31/xx as of 12/31/18
(3) Provided by TDI (1992 MR = 1992 manual rates)
(4) Represents 1/1/98 through 1/1/18 rate changes for TWIA; factors assume uniform earning of written premium and that TWIA premium represents 74.6% of industry data in Tier 1 -- Territory 10
(5) = (3) * (4) for 1983 - 1992; (2) * (4) for 1993 - 2018
(6) Provided by TDI. 1983 - 1995 are year ending 9/30/xx as of 12/31/99; 1996 - 2008 are year ending 12/31/xx as of 12/31/17 2009 - 2018 are year ending 12/31/xx as of 12/31/2018
(7) = (6) / (5)

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

AY Ending	Earned Premium	Earned Premium at 1992 MR	TWIA Factor to Current Rate Level	Earned Premium at Current Rates	Incurred Loss	Incurred Loss Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1983	7,250,559	7,334,192	3.098	22,721,327	33,451,768	147.2%
1984	6,146,403	7,090,092	3.098	21,965,105	3,096,573	14.1%
1985	7,715,669	8,264,972	3.098	25,604,883	2,019,280	7.9%
1986	11,101,057	8,943,773	3.098	27,707,809	3,439,343	12.4%
1987	19,731,857	16,746,125	3.098	51,879,495	1,552,595	3.0%
1988	14,491,218	13,901,265	3.098	43,066,119	2,041,063	4.7%
1989	14,584,082	16,324,747	3.098	50,574,066	2,746,147	5.4%
1990	12,102,427	14,172,295	3.098	43,905,770	2,967,816	6.8%
1991	13,947,169	17,133,114	3.098	53,078,387	2,440,246	4.6%
1992	15,779,782	19,121,264	3.098	59,237,676	2,232,412	3.8%
1993	13,455,788		3.098	41,686,031	2,357,383	5.7%
1994	6,449,086		3.098	19,979,268	1,579,205	7.9%
1995	17,734,471		3.098	54,941,391	11,314,057	20.6%
1996	28,876,403		3.098	89,459,096	5,938,855	6.6%
1997	27,434,262		3.098	84,991,344	7,691,121	9.0%
1998	26,616,230		3.145	83,708,043	7,574,576	9.0%
1999	23,901,401		3.194	76,341,075	6,821,707	8.9%
2000	19,819,200		3.057	60,587,294	35,670,537	58.9%
2001	21,641,352		2.873	62,175,604	17,852,673	28.7%
2002	31,941,586		2.749	87,807,420	8,461,924	9.6%
2003	35,755,041		2.556	91,389,885	28,411,179	31.1%
2004	54,522,810		2.323	126,656,488	3,982,223	3.1%
2005	55,697,704		2.112	117,633,551	59,821,556	50.9%
2006	61,057,252		1.958	119,550,099	6,946,289	5.8%
2007	61,608,161		1.774	109,292,878	10,794,322	9.9%
2008	58,154,456		1.676	97,466,868	477,796,637	490.2%
2009	62,172,956		1.527	94,938,104	9,127,735	9.6%
2010	70,229,705		1.407	98,813,195	3,349,546	3.4%
2011	68,835,250		1.373	94,510,798	17,847,819	18.9%
2012	76,595,910		1.307	100,110,854	10,913,315	10.9%
2013	88,953,062		1.245	110,746,562	8,032,548	7.3%
2014	103,639,645		1.186	122,916,619	5,625,255	4.6%
2015	104,805,017		1.129	118,324,864	16,825,917	14.2%
2016	97,761,451		1.076	105,191,321	32,844,176	31.2%
2017	89,809,431		1.050	94,299,903	123,339,558	130.8%
2018	92,634,418		1.024	94,857,644	17,867,459	18.8%
Total	1,522,952,271			2,758,116,838	994,774,815	36.1%

Notes:

(2) Provided by TDI. 1983 - 1995 are year ending 9/30/xx as of 12/31/99; 1996 - 2018 are year ending 12/31/xx as of 12/31/18
(3) Provided by TDI (1992 MR = 1992 manual rates)
(4) Represents 1/1/98 through 1/1/18 rate changes for TWIA; factors assume uniform earning of written premium and that TWIA premium represents 1.0% of industry data in Tier 2
(5) = (3) * (4) for 1983 - 1992; (2) * (4) for 1993 - 2018
(6) Provided by TDI. 1983 - 1995 are year ending 9/30/xx as of 12/31/99; 1996 - 2008 are year ending 12/31/xx as of 12/31/17
2009 - 2018 are year ending 12/31/xx as of 12/31/2018
(7) = (6) / (5)

Texas Windstorm Insurance Association
Commercial 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	277,830	3.473	964,904
Brazoria	493,586	2.916	1,439,297
Calhoun	112,097	3.246	363,867
Cameron	999,634	3.404	3,402,754
Chambers	58,987	2.532	149,355
Galveston	2,382,030	8.667	20,645,054
Harris	38,105	5.883	224,172
Jefferson	397,141	2.650	1,052,424
Kenedy	694	1.194	829
Kleberg	17,254	1.091	18,824
Matagorda	93,289	3.078	287,144
Nueces	1,584,979	3.601	5,707,509
Refugio	21,241	1.447	30,736
San Patricio	136,263	2.309	314,631
Willacy	14,648	2.519	36,898
Total	6,627,778	5.226	34,638,398

(5) Inforce-Premium as of Nov 30, 2018 at Present Rates	64,955,934
(6) Indicated Hurricane Loss Ratio	53.3%

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
Commercial 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	277,830	961,004	1.004	3.473
Brazoria	493,586	1,433,581	1.004	2.916
Calhoun	112,097	362,453	1.004	3.246
Cameron	999,634	3,388,873	1.004	3.404
Chambers	58,987	148,771	1.004	2.532
Galveston	2,382,030	20,563,119	1.004	8.667
Harris	38,105	223,260	1.004	5.883
Jefferson	397,141	1,048,149	1.004	2.650
Kenedy	694	825	1.004	1.194
Kleberg	17,254	18,741	1.004	1.091
Matagorda	93,289	286,002	1.004	3.078
Nueces	1,584,979	5,685,529	1.004	3.601
Refugio	21,241	30,606	1.004	1.447
San Patricio	136,263	313,443	1.004	2.309
Willacy	14,648	36,754	1.004	2.519
Total	6,627,778	34,501,110	1.004	5.226

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
Commercial 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	277,830	3.851	1,069,923
Brazoria	493,586	3.511	1,732,980
Calhoun	112,097	4.905	549,836
Cameron	999,634	5.077	5,075,142
Chambers	58,987	3.259	192,239
Galveston	2,382,030	6.486	15,449,847
Harris	38,105	5.118	195,021
Jefferson	397,141	2.987	1,186,260
Kenedy	694	2.111	1,465
Kleberg	17,254	2.004	34,577
Matagorda	93,289	4.246	396,105
Nueces	1,584,979	4.022	6,374,786
Refugio	21,241	2.784	59,135
San Patricio	136,263	3.226	439,584
Willacy	14,648	4.040	59,178
Total	6,627,778	4.951	32,816,078
(5) Inforce-Premium as of Nov 30, 2018 at Present Rates			64,955,934
(6) Indicated Hurricane Loss Ratio			50.5%

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
Commercial 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	277,830	1,051,069	1.018	3.851
Brazoria	493,586	1,702,302	1.018	3.511
Calhoun	112,097	540,141	1.018	4.905
Cameron	999,634	4,985,048	1.018	5.077
Chambers	58,987	188,826	1.018	3.259
Galveston	2,382,030	15,176,508	1.018	6.486
Harris	38,105	191,578	1.018	5.118
Jefferson	397,141	1,165,361	1.018	2.987
Kenedy	694	1,439	1.018	2.111
Kleberg	17,254	33,971	1.018	2.004
Matagorda	93,289	389,138	1.018	4.246
Nueces	1,584,979	6,261,586	1.018	4.022
Refugio	21,241	58,082	1.018	2.784
San Patricio	136,263	431,863	1.018	3.226
Willacy	14,648	58,126	1.018	4.040
Total	6,627,778	32,235,038	1.018	4.951

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

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

Exhibit 9

Landfall Year	Month	Name	Landfall 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
53.0-Year	1/1/1966 - 12/31/2018	15	53.0	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
Commercial Property - Wind & Hail
Rate Level Review
Calculation of Earned Premium at Present Rate Level

Year	TWIA Written Premium	Factor to Current Rate Level	Written Premium at Current Rate Level	Earned Premium at Current Rate Level
(1)	(2)	(3)	(4)	(5)
1994	10,672,677	3.098	33,063,953	33,063,953
1995	12,865,905	3.098	39,858,574	36,461,264
1996	15,640,660	3.098	48,454,765	44,156,670
1997	16,536,186	3.098	51,229,104	49,841,935
1998	16,558,977	3.193	52,872,814	52,050,959
1999	17,394,142	3.193	55,539,496	54,206,155
2000	17,332,561	2.930	50,784,404	53,161,950
2001	17,544,251	2.817	49,422,155	50,103,280
2002	24,013,525	2.684	64,452,301	56,937,228
2003	29,220,514	2.440	71,298,054	67,875,178
2004	31,009,323	2.218	68,778,678	70,038,366
2005	35,740,174	2.016	72,052,191	70,415,435
2006	76,847,840	1.870	143,705,461	107,878,826
2007	110,951,718	1.714	190,171,245	166,938,353
2008	98,036,118	1.633	160,092,981	175,132,113
2009	111,269,573	1.423	158,336,602	159,214,792
2010	102,174,680	1.407	143,759,774	151,048,188
2011	100,017,021	1.340	134,022,808	138,891,291
2012	110,524,397	1.276	141,029,130	137,525,969
2013	112,904,624	1.216	137,292,023	139,160,577
2014	104,642,688	1.158	121,176,233	129,234,128
2015	98,715,934	1.102	108,784,959	114,980,596
2016	88,278,690	1.050	92,692,625	100,738,792
2017	70,749,081	1.050	74,286,535	83,489,580
2018	65,696,833	1.000	65,696,833	69,991,684
Total	1,429,641,258		2,263,156,865	2,242,545,578

Notes:

(2) Provided by TWIA

(3) Exhibit 10, Sheet 2

(4) = (2) * (3) (calculated on a monthly basis)

(5) Calculated from (4), using annual uniform earning assumption for 2002 and prior and monthly for 2003 and after

Texas Windstorm Insurance Association
Commercial Property - Wind & Hail
Rate Level Review
Calculation of On-Level Premium Factors

Year	Rate Level in Effect Applicable Rates B.O.Y.			E.O.Y.	Cumulative Rate Level B.O.Y.			E.O.Y.	# Months B.O.Y.			E.O.Y.	Average Rate Level	Factor to Current Rate Level
(1)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1980	Prior			8/1/1980	1.000			1.175	7.0			5.0	1.073	4.637
1981	8/1/1980			9/1/1981	1.175			1.132	8.0			4.0	1.161	4.285
1982	9/1/1981			9/1/1982	1.132			1.428	8.0			4.0	1.231	4.042
1983	9/1/1982			10/10/1983	1.428			1.514	9.3			2.7	1.447	3.438
1984	10/10/1983			10/10/1983	1.514			1.514	12.0			0.0	1.514	3.286
1985	10/10/1983	3/1/1985	3/15/1985	11/15/1985	1.514	1.892	2.428	2.651	2.0	0.5	8.0	1.5	2.281	2.181
1986	11/15/1985			11/15/1985	2.651			2.651	12.0			0.0	2.651	1.877
1987	11/15/1985			7/1/1987	2.651			2.407	6.0			6.0	2.529	1.967
1988	7/1/1987			11/1/1988	2.407			2.075	10.0			2.0	2.352	2.115
1989	11/1/1988			11/1/1988	2.075			2.075	12.0			0.0	2.075	2.398
1990	11/1/1988			3/1/1990	2.075			2.104	2.0			10.0	2.099	2.370
1991	3/1/1990			4/1/1991	2.104			2.083	3.0			9.0	2.088	2.383
1992	1/1/1992			1/1/1992	1.606			1.606	12.0			0.0	1.606	3.098
1993	1/1/1992			10/1/1993	1.606			1.606	9.0			3.0	1.606	3.098
1994	10/1/1993			10/1/1993	1.606			1.606	12.0			0.0	1.606	3.098
1995	10/1/1993			10/1/1993	1.606			1.606	12.0			0.0	1.606	3.098
1996	10/1/1993			10/1/1993	1.606			1.606	12.0			0.0	1.606	3.098
1997	10/1/1993			10/1/1993	1.606			1.606	12.0			0.0	1.606	3.098
1998	1/1/1998			1/1/1998	1.558			1.558	12.0			0.0	1.558	3.193
1999	1/1/1998			1/1/1998	1.558			1.558	12.0			0.0	1.558	3.193
2000	1/1/2000			1/1/2000	1.698			1.698	12.0			0.0	1.698	2.930
2001	1/1/2001			1/1/2001	1.766			1.766	12.0			0.0	1.766	2.817
2002	1/1/2002			1/1/2002	1.854			1.854	12.0			0.0	1.854	2.684
2003	1/1/2003			1/1/2003	2.039			2.039	12.0			0.0	2.039	2.440
2004	1/1/2004			1/1/2004	2.243			2.243	12.0			0.0	2.243	2.218
2005	1/1/2005			1/1/2005	2.468			2.468	12.0			0.0	2.468	2.016
2006	1/1/2006			9/1/2006	2.591			2.798	8.0			4.0	2.660	1.870
2007	1/1/2007			1/1/2007	2.902			2.902	12.0			0.0	2.902	1.714
2008	1/1/2007			2/1/2008	2.902			3.059	1.0			11.0	3.046	1.633
2009	2/1/2008			2/1/2009	3.059			3.536	1.0			11.0	3.496	1.423
2010	2/1/2009			2/1/2009	3.536			3.536	12.0			0.0	3.536	1.407
2011	1/1/2011			1/1/2011	3.713			3.713	12.0			0.0	3.713	1.340
2012	1/1/2012			1/1/2012	3.898			3.898	12.0			0.0	3.898	1.276
2013	1/1/2013			1/1/2013	4.093			4.093	12.0			0.0	4.093	1.216
2014	1/1/2014			1/1/2014	4.298			4.298	12.0			0.0	4.298	1.158
2015	1/1/2015			1/1/2016	4.513			4.513	12.0			0.0	4.513	1.102
2016	1/1/2016			1/1/2017	4.738			4.738	12.0			0.0	4.738	1.050
2017	1/1/2017			1/1/2018	4.738			4.738	12.0			0.0	4.738	1.050
2018	1/1/2018			1/1/2019	4.975			4.975	12.0			0.0	4.975	1.000
Current								4.975					4.975	1.000

Notes:

(1) - (4) Rates in effect and beginning and end of year (B.O.Y. and E.O.Y.)
For each year except 1985, 2006, and 2008 the B.O.Y. and E.O.Y. rates are the only rates applicable
For 1985, there were two additional rate changes
For 2006, there was one additional rate change
For 2008, the rate change took effect mid-year

(5) - (8) Based on Exhibit 10, Sheet 3

(9) - (12) Number of months that each of the rates were effective

(13) = Weighted average of (5) - (8) using (9) - (12) as weights

(14) = Current (13) / (13)

Texas Windstorm Insurance Association
Commercial Property - Wind & Hail
Rate Level Review
History of Rate Level Changes

Effective Date	Rate Change	Cumulative Rate Level
(1)	(2)	(3)
Prior		1.000
8/1/80	17.5%	1.175
9/1/81	-3.7%	1.132
9/1/82	26.2%	1.428
10/10/83	6.0%	1.514
3/1/85	25.0%	1.892
3/15/85	28.3%	2.428
11/15/85	9.2%	2.651
7/1/87	-9.2%	2.407
11/1/88	-13.8%	2.075
3/1/90	1.4%	2.104
4/1/91	-1.0%	2.083
1/1/92	-22.9%	1.606
10/1/93	0.0%	1.606
1/1/98	-3.0%	1.558
1/1/00	9.0%	1.698
1/1/01	4.0%	1.766
1/1/02	5.0%	1.854
1/1/03	10.0%	2.039
1/1/04	10.0%	2.243
1/1/05	10.0%	2.468
1/1/06	5.0%	2.591
9/1/06	8.0%	2.798
1/1/07	3.7%	2.902
2/1/08	5.4%	3.059
2/1/09	15.6%	3.536
1/1/11	5.0%	3.713
1/1/12	5.0%	3.898
1/1/13	5.0%	4.093
1/1/14	5.0%	4.298
1/1/15	5.0%	4.513
1/1/16	5.0%	4.738
1/1/17	0.0%	4.738
1/1/18	5.0%	4.975

Notes:

(2) Provided by TWIA, excludes 1/1/92 refund on in-force policies
(3) = Cumulation of (2)

Texas Windstorm Insurance Association
Commercial Property - Wind & Hail
Rate Level Review
Fixed Expenses and 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 DEP	5.3%	5.8%	7.5%	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)

Rate Level Review
Development of Reinsurer Expense
Using Average of AIR and RMS Hurricane Models

		Net of Depop
(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
(2b) Provided by Guy Carpenter, based on RMS model using TWIA exposures as of 11/30/2018
(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 12/31/2018
(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
Commercial Property - Wind & Hail
Rate Level Review
Reconciliation of Paid Loss Data to Schedule P

Accident Year	TWIA Provided Paid Loss Commercial & Farm	Residential	Total	Schedule P Direct & Assumed Paid Loss	Difference
(1)	(2)	(3)	(4)	(5)	(6)
2008	857,250,899	1,709,067,474	2,566,318,373	2,562,744,000	3,574,373
2009	2,553,456	8,479,585	11,033,041	10,403,000	630,041
2010	7,478,289	10,958,718	18,437,007	18,005,000	432,007
2011	19,217,587	76,980,633	96,198,220	96,089,000	109,220
2012	14,459,642	52,332,695	66,792,337	66,741,000	51,337
2013	7,351,329	63,503,334	70,854,663	70,811,000	43,663
2014	1,056,281	6,114,172	7,170,453	7,002,000	168,453
2015	18,644,220	119,845,638	138,489,858	138,569,000	(79,142)
2016	2,584,005	25,883,611	28,467,616	28,391,000	76,616
2017	386,172,429	855,680,672	1,241,853,101	1,241,954,000	(100,899)
2018	164,741	9,256,158	9,420,899	9,089,000	331,899
Total	1,316,932,878	2,938,102,690	4,255,035,568	4,249,798,000	5,237,568

Notes:

(2), (3) Provided by TWIA, as of 12/31/2018
(4) = (2) + (3)
(5) Based on TWIA 2018 Annual Statement
(6) = (4) - (5)

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

Calendar Year	TWIA Provided Written Premium			Annual Statement Gross Written Premium	Difference
	Commercial	Residential	Total		
(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 12/31/2018
(4) = (2) + (3)
(5) Based on TWIA Annual Statements
(6) = (4) - (5)