August 31, 2018
Floyd Yager, Chair
Florida Commission on Hurricane Loss Projection Methodology
c/o Donna Sirmons
Florida State Board of Administration
1801 Hermitage Boulevard, Suite 100
Tallahassee, Florida 32308

Re: AIR Hurricane Model for the United States Version 16.1.0 as Implemented in Touchstone Version 6.0.0

Dear Mr. Yager:

AIR has recently released an updated software platform, Touchstone Version 6.0.0, that contains the AIR Hurricane Model for the United States (the U.S. Hurricane Model) Version 16.1.0. The updated software platform, Version 6.0.0, also contains an update to one geographical database, the AIRAddressServer, that could be leveraged for the calculation of hurricane wind loss costs in the state of Florida.

AIR would like to submit the AIR Hurricane Model for the United States Version 16.1.0 as Implemented in Touchstone Version 6.0.0 under Report of Activities, Section VI.G. as an interim software update and Section VI.H as it contains an interim geographical data update.

Interim Software Update

Touchstone Version 6.0.0 contains various updates and enhancements to both models and the software platform which do not impact the hurricane wind loss costs as well as the probable maximum loss levels (PMLs) in FL. As required,, we have included a list of the updates that have been incorporated into Version 6.0.0:

- Comprehensive enhancements to the Europe models – this includes the introduction of the new AIR Severe Thunderstorm Model for EU, updates to the AIR Extratropical Cyclone and Earthquake Models of Europe, enhancements to the AIR Inland Flood and Earthquake Models for Southeast EU as well as updates to the geographic data such as CRESTA codes, boundaries and centroids in EU.
- Updates to two US models – updates to the AIR Wildfire and Inland Flood Models
- Updates to the AIR US Hurricane Model for Offshore Assets (the Offshore Model) – updates to the Offshore Industry Exposure Database and the oil and gas prices, which are used to calculate the cost of business interruption when the production platform is out of operation. The Offshore Model simulates the effects of winds and waves on insured oil and gas-production as well as drilling units in the Gulf of Mexico and estimates the corresponding insured losses.
- Introduction of Model Builder – this is a standalone tool that allows companies to deploy their custom-built or other third-party catastrophe models in the Touchstone platform. This new feature in Touchstone provides flexibility for users to incorporate their view of risk (for example, for perils or regions that are not currently covered by AIR) as well as allowing users to view and store modeled results from AIR and non-AIR models in one software platform. In the case that a non-AIR model is utilized for an analysis, Touchstone will provide explicit reference to the non-AIR models in the analysis log, as shown in the example below. The red boxes in Figure 1 and Figure 2 highlight the two sections of the log, Event Set Type and Hazard Models, where the relevant information is shown. For example, when a non-AIR model was run as in Figure 1, the Event Set Type shown is “Model Builder” whereas ‘Stochastic” is shown as the Event Set Type in Figure 2, when the AIR models have been selected.

```
o Event Set Options

    Event Set Name:                   Fiji_Building_Model105_20180801
    Event Set Type:                   ModelBuilder
    Event Filter:                     Off
    Demand Surge:                     Off

    Perils:                           Tropical Cyclone - Wind



    Hazard Models:                    Model:  Model Version:  Catalog:                          Catalog Version:  Events:  Scenarios:
    Fiji_Building_Model105_20180801   105     1.0.0           Fiji_Building_Model105_20180801   01.00.00          53       53

o Financial Model Options

    Correlation:                      Off
    Disaggregation:                   Off
    Average Properties:               Off
    Invalid Con/Occ Pairs:            Ignore
    Apply residential location terms: AIR Default behavior
    Intra-Policy Correlation Factor:  0%
    Inter-Policy Correlation Factor:  0%

o Reinsurance Options

    Program Name:                     N/A
    Order of application of Fac:      Apply and inure to the benefit of treaties
    FAC Reinsurance Count:            0
    Treaty Reinsurance  Count:        0
```

Figure 1. Example of the Analysis Log - User Models

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o Event Set Options

    Event Set Name:                   50K US AP (2017) - Standard
    Event Set Type:                   Stochastic
    Event Filter:                     Off
    Demand Surge:                     On
    Custom Demand Surge:              No

    Perils:                           Tropical Cyclone - Wind



    Hazard Models:                                 Model:   Model Version:  Catalog:                                   Catalog Version:  Events:  Scenarios:
    AIR Hurricane Model for Hawaii                 23       3.10.0          AIR Hurricane Model for Hawaii             04.01.0509        10330    50000
    AIR Hurricane Model for Offshore Assets        27 (24)  1.11.0          AIR North Atlantic Basinwide Hurricane Model  17.00.0808     723844   50000
    AIR Hurricane Model for the U.S.               27 (21)  16.1.0          AIR North Atlantic Basinwide Hurricane Model  17.00.0808     723844   50000
    AIR Tropical Cyclone Model for Caribbean       27 (25)  9.1.0           AIR North Atlantic Basinwide Hurricane Model  17.00.0808     723844   50000
    AIR Tropical Cyclone Model for Central America 27 (67)  2.2.0           AIR North Atlantic Basinwide Hurricane Model  17.00.0808     723844   50000
    AIR Tropical Cyclone Model for Mexico          27 (29)  1.0.0           AIR North Atlantic Basinwide Hurricane Model  17.00.0808     723844   50000

o Financial Model Options

    Correlation:                      Off
    Disaggregation:                   Off
    Average Properties:               On
    Invalid Con/Occ Pairs:            Ignore
    Apply residential location terms: AIR Default behavior
    Intra-Policy Correlation Factor:  0%
    Inter-Policy Correlation Factor:  0%

o Reinsurance Options

    Program Name:                     N/A
    Order of application of Fac:      Apply and inure to the benefit of treaties
    FAC Reinsurance Count:            0
    Treaty Reinsurance  Count:        0
```

Figure 2. Example of the Analysis Log – AIR Models

- User Interface (UI) and Navigation Enhancements – updates to the Touchstone UI include new functionalities to further improve user workflow, such as the ability for a user to import/export projects, the introduction of the Modeled Exposure Summary Table and Zonal Analytics functionality:
    - Import/Export projects - this new feature allows convenient data transfer between various Touchstone users, such as when insurance companies provide data to re-insurance brokers and vice versa, while maintaining the integrity of the original data and the preset configurations within Touchstone. For example, an insurer can export a particular project from their Touchstone environment along with the underlying exposure, which has been already processed and imported into the software, then provide the exported project file and database to their re-insurance broker. The broker, who also has access to the same version of Touchstone, could conveniently import the project as well as attach the exposure database without repeating the steps for data cleaning/mapping. In this case, the set-up of the

project would be identical between the insurer and the re-insurer broker, hence reducing the possibility of inconsistency in their analytical work.

- Introduction of the Modeled Exposure Summary Table - this new summary statistics table in the UI provides better clarity on the imported vs. analyzed exposure of an analysis by summarizing information such as the total replacement values, total insured values, number of locations for the user.
- Introduction of Zonal Analytics - the new functionality enables users to perform analyses and report outputs by customized geographic zones. For example, a user can request Touchstone to report the combined modeled results for a multi-state zone which encompasses all the risks in AL, FL and LA or a multi-county zone which includes all risks from Miami-Dade and Broward, with no additional calculation outside of the box. In the previous version, modeled results could only be reported by default geographic definitions such as state, county or ZIP Codes. As in the given example, before the introduction of Zonal Analytics, Touchstone would report losses by state or county and the user would need to manually combine the modeled results from AL, FL and LA or from Miami-Dade and Broward in their post-processing.

Interim Geographical Data Update

In addition to the enhancements mentioned above, Touchstone Version 6.0 incorporates the 2017 updates to the U.S. Census Topological Integrated Geographic Encoding and Referencing (TIGER)/Line data in one of the geographical databases, AIRAddressServer. The AIRAddressServer database is the primary source of geocoding assignments when detailed street address information is present in the company's exposure data. Therefore, this update has no impact on the ZIP Code centroids modeled for FL or resulting loss costs from a ZIP-aggregated exposure set containing no street information; it may have an impact on loss costs from an exposure set with detailed street information. The varying impacts on loss costs would depend on the type of exposure used for the analysis:

1. Exposure with ZIP Code information and no address information (see Location 1 in Table 1) – this geographical data update has no impact on loss costs or the PMLs, as shown in the A-Forms required by the Commission. In the case of ZIP aggregated exposure data, geocoding uses only the ZIPAll database, which has not been updated in Version 6.0.
2. Exposure imported with geocodes (latitude/longitude) supplied by user (see Location 2 in Table 1) – this geographical data update has no impact on loss costs or the PMLs. When the user supplies geocodes, geocoding is not required.
3. Exposure imported with detailed street address information (see Location 3 in Table 1) – this geographical update may impact loss costs if the street information provided by the US Census has been enhanced. For exposures imported with detailed street address information Touchstone uses its AIRAddressServer database to retrieve geocodes based on the address information provided by the user, including street names, street numbers, city information as well as ZIP Codes.

Below is an example to demonstrate the impact on losses for the three exposure types mentioned above. In Table 1 below, we show a loss comparison for three risks in Florida; Location 1 corresponds to case 1 listed above, Location 2 corresponds to case 2, and Location 3 corresponds to case 3 above. Losses for Location 1 and 2 remain the same between Version 4.1 and 6.0 as the geocoding for these two locations have not been affected by the US Census TIGER data update. On the other hand, there is a slight loss change for Location 3 as it relies on the AIRAddressServer, which reflects the TIGER data update. The updated TIGER data results in a small difference in the assigned geocode between Version 4.1 and 6.0 due to the US Census TIGER data update.

Specifically, the update to the TIGER data in the AIRAddressServer improves the geocode assigned in Version 6.0 for Location 3, where street/address information is used for geocoding. In Version 4.1, the street numbers were not available in the TIGER data for Touchstone to locate the exact location of street number 3405 on Chestnut Ridge Way. As the result, the street centroid was used in the geocoding assignment. In Version 6.1, the information of street numbers is available in the updated TIGER data enabling Touchstone to calculate the geocodes based on the exact street number imported.

Location	City	Address	Postal Code	Subarea Name	Area Code	Latitude	Longitude	Lat/Lon Assigned by TS? (Y/N)	TS 4.1 GrossLoss	TS 6.0 GrossLoss	Percent Diff
1			32065	Clay	FL	30.15265	-81.803039	Y	99.80	99.80	0.00%
2				Clay	FL	30.16328	-81.83773	N	91.87	91.87	0.00%
3	ORANGE PARK	3405 CHESTNUT RIDGE WAY	32065	Clay	FL	30.16224	-81.835525	Y	92.13	91.87	-0.28%

Table 1. Loss Impact by Exposure Type

As mentioned, the updated AIRAddressServer in Touchstone Version 6.0 contains the new information from the TIGER/Line data released by the US Census in September 2017. The TIGER shapefiles are spatial extracts from the Census Bureau's Master Address File (MAF)/TIGER database, containing features such as boundaries, roads, address information and other geographic information. The update generally includes data on new streets, enhanced street directional, street types as well as latitude/longitudes corresponding to the start and endpoints of street segments collected by the US Census across various jurisdictions. In general, the overall street match/geocoding improves by 1 to 2% with each annual release. The resulting changes in the modeled loss costs and PMLs at the portfolio level are minimal and are generally less than 0.01% based on a test client portfolio comprised of roughly 200,000 locations across Florida.

In accordance with the 2017 Report of Activities, Section VI.G. and VI.H, we have prepared the following forms with results from the currently acceptable version, 4.1.0, and the updated version, 6.0.0, as well as a percentage change that demonstrates no change for ZIP-aggregated exposures for the Commission's review:

- Form A-1 (Zero Deductible Personal Residential Loss Costs by ZIP Code)
- Form A-4 (Output Ranges)
- Form A-8 (Probable Maximum Loss for Florida)
- Form S-5 (Average Annual Zero Deductible Statewide Loss Costs – Historical versus Modeled)
- Form V-2 (Hurricane Mitigation Measures and Secondary Characteristics, Range of Changes in Damage)

Additionally, in accordance with the 2017 Report of Activities, Section VI.H., we have prepared maps with all ZIP Code centroids as well as a sorted list of all ZIP Codes and corresponding primary counties from the currently acceptable version, 4.1.0, and the updated version, 6.0.0, for the Commission's review:

- Maps of the old and old ZIP Code centroids – see maps named, AIR15_ZIPCentroid_Map_FL_TS4.1.0, AIR15_ZIPCentroid_Map_FL_TS6.0.0 and AIR15_ZIPCentroid_Map_FL_TS4.1.0_vs_TS6.0.0.
- A list of all ZIP Code centroid movements of one mile or more, the top ten movements and the new and retired ZIP Codes – this geographical data update does not cause movements in modeled ZIP Code centroids. A list of all ZIP Codes and their primary counties are included in file named, AIR15_ZIPCode_List_TS4.1.0_vs_TS6.0.0_Final.
- A list of the impacted ZIP Code related databases – this geographical data update does not impact the AIR ZIPAll database

AIR would like to submit and request the review of Touchstone 6.0.0 under the Report of Activities, Section VI.G. and VI.H., for considerations of an interim software update and an interim geographical data update in conjunction. We ask that the Commission confirm that the AIR Hurricane Model for the United States v16.1.0 as implemented in Touchstone 6.0.0 is considered as acceptable under the 2015 Standards.

Best regards,

Brandie Andrews, CEEM
Vice President, Regulatory and Rating Agency Client Services