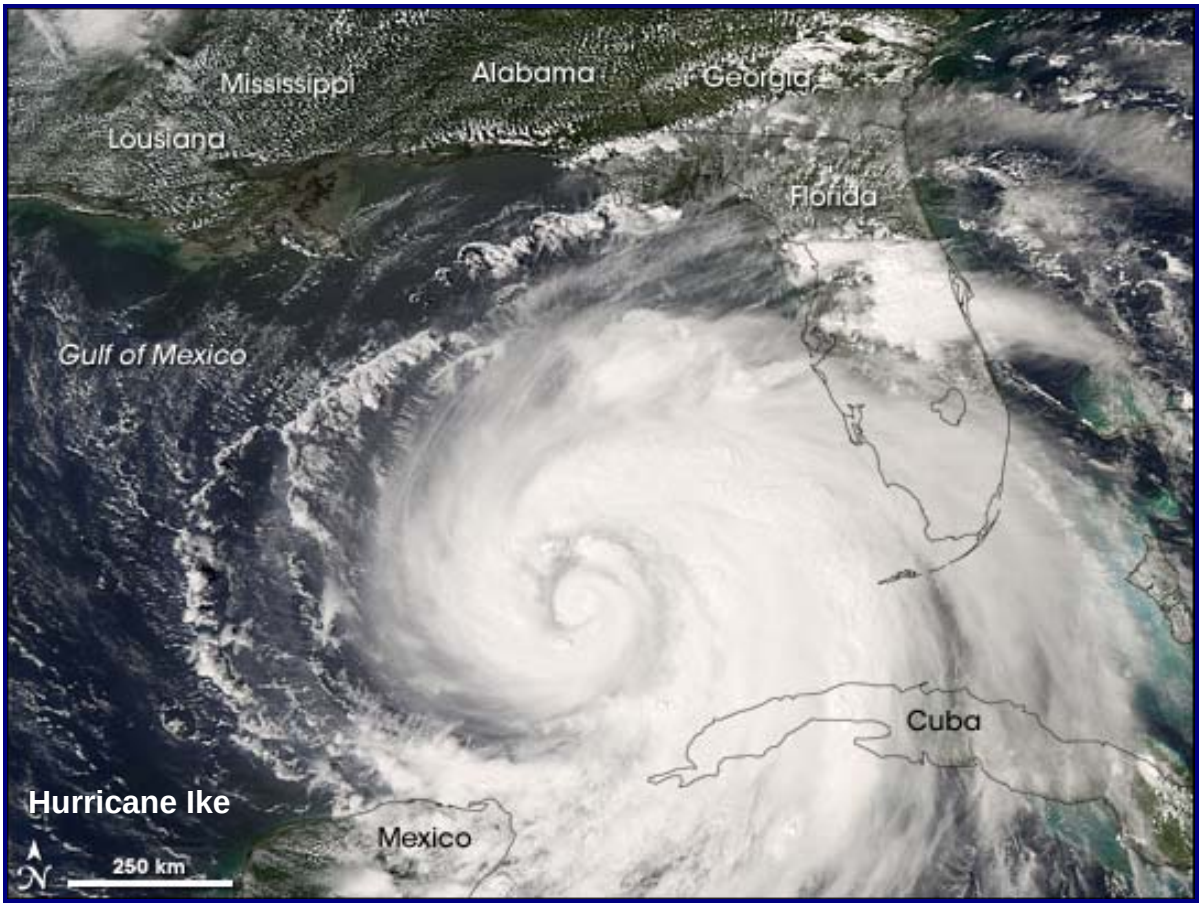
Florida Commission on Hurricane Loss Projection Methodology



Professional Team Report
2008 Standards

AIR Worldwide Corporation

On-Site Review
March 31 – April 2, 2009

Additional Verification Review
May 18, 2009

On March 31 – April 2, 2009, the Professional Team visited on-site at AIR Worldwide Corporation (AIR) in Boston, Massachusetts. The following participated in the review:

AIR
Tanya Bedore, Technical Writer
Jason Butke, Research Scientist/Meteorologist
Justin Cox, Ph.D., Research Scientist/Meteorologist
Peter Dailey, Ph.D., Assistant Vice President
Tim Doggett, Ph.D., Senior Research Scientist
Jayanta Guin, Ph.D., Senior Vice President
Cheryl Hayes, Manager, Exposures Group
Hua He, Ph.D., Research Engineer
Mary Healy, Ph.D., Research Statistician
Vineet Jain, Ph.D., Project Manager
Todd Keller, Research Analyst
Bethany Kocher, Risk Analyst (via phone)
Ellen Langhans, Communications Specialist
David Lalonde, FCAS, FCIA, MAAA, Senior Vice President
Nick Lamparelli, Risk Consultant
Greta Ljung, Ph.D., Senior Research Statistician
Tyler Maxwell, Software Engineer
Stuart Miller, Ph.D., Risk Consultant
Joseph Minor, Ph.D., P.E., Consulting Engineer (via phone)
Sudhir Potharaju, Senior Software Engineer
Glenn Rivard, Software Engineer
John Rollins, FCAS, MAAA, Vice President
John Rowe, Senior Manager, Research & Modeling
Scott Stransky, Research Scientist

Professional Team
Mark Brannon, FCAS, MAAA, CPCU, Actuary
Jenni Evans, Ph.D., Meteorologist
Paul Fishwick, Ph.D., Computer Scientist
Mark Johnson, Ph.D., Statistician, Team Leader
Richard Nance, Ph.D., Computer Scientist
Marty Simons, ACAS, Actuary
Masoud Zadeh, Ph.D., P.E., Structural Engineer
Donna Sirmons, Staff

The review began with introductions and an overview of the audit process. The Professional Team reviewed AIR's responses to the deficiencies noted at the March 19, 2009, Commission meeting. AIR provided updated Expert Certification Forms G-1, G-4, G-6, and G-7 in response to the deficiencies.

The Professional Team reviewed the following corrections to be included in the revised submission to be provided to the Commission no later than 10 days prior to the May 19-21, 2009 meetings.

1. Page 17, G-1.2, storm track revised to be consistent with Table 2 and Table 17

2. Page 19, G-1.3, Figure 3 revised to remove symbols from Generate Values for Severity Variables step in flowchart
3. Page 25, G-1.4, period added at end of Pawale et al. reference
4. Page 39, G-2.2B, consistent spelling of Kiran Lalam's name
5. Page 40, G-2.2C, Sudhir Potharaju's name added to flowchart under Software Engineering
6. Page 41, G-2.3A, Tyler Maxwell removed as independent reviewer for Computer Science
7. Page 46, G-5.1, revised to document process change as a result of the error in the output ranges provided in the submission document
8. Pages 47-53, Forms G-1 through G-7 updated after review of submission revisions
9. Page 57, M-2.1, language and Table 2 revised to be consistent with Table 17
10. Pages 59-60, M-2.3, storm track and wind field generation paragraphs removed, storm heading at landfall revised
11. Page 64, M-3.1, revised to reflect actual process
12. Page 89, V-1.E, time periods added
13. Page 91, V-1.2, loss amounts updated
14. Pages 111-114, Form V-2, Table 8 160 mph column entries corrected
15. Page 144, A-9.C, footnote added to Figure 36
16. Pages 153-155, Form A-2, loss costs maps corrected
17. Pages 157-158, Form A-3, revised to use correct data
18. Page 271, Form A-7, instructions corrected to conform to 2008 Report of Activities
19. Page 339, C-5.C, statement for checksum verification revised
20. Page 359, Attachment C, reference to independent audit removed

Additional Verification Review – May 18, 2009

AIR submitted revised Forms A-6, A-7, and A-8 on May 11, 2009 in accordance with the Form A-6 instructions contained in the Report of Activities. The Professional Team met with AIR on May 18, 2009 in Tallahassee to review the revisions and the errors identified by AIR in the application of policy limits to losses with demand surge and the application of Florida annual hurricane deductibles in completing Form A-6, Output Ranges.

The following individuals participated in the additional verification review:

AIR
Bethany Kocher, Risk Analyst
David Lalonde, FCAS, FCIA, MAAA, Senior Vice President
Rob Newbold, Assistant Vice President (via phone)
John Rollins, FCAS, MAAA, Vice President

Professional Team
Paul Fishwick, Ph.D., Computer Scientist
Mark Johnson, Ph.D., Statistician, Team Leader
Marty Simons, ACAS, Actuary
Donna Sirmons, Staff

AIR provided an explanation of the changes made to incorporate year built in the modeled exposure data and the application of annual deductibles and demand surge as they relate to Form A-6, Output Ranges. All Standards remain verified.

Report on Deficiencies

The Professional Team reviewed the following deficiencies identified by the Commission at the March 19, 2009 meeting. The deficiencies were corrected by the established time frame and the corrections have been verified.

1. Standard G-1 (page 14)
   In response to standard, no mention of probable maximum loss as part of the scope

2. Standard A-11 (page 149)
   No response to standard

3. Standard C-1 (page 322)
   Response to part C is included as part D of the standard

Professional Team Pre-Visit Letter

The Professional Team's pre-visit letter questions are provided in the report under the corresponding Standards.

Pre-Visit Letter

The purpose of the pre-visit letter is to outline specific issues unique to the modeler's submission. The goal is to identify lines of inquiry to be followed during the on-site review so as to allow adequate advance preparation by the modeler. Aside from due diligence with respect to the full submission, various requests for information and questions that the Professional Team is certain to ask the modeler during the on-site review are provided in this letter. This letter does not preclude the Professional Team from asking for additional information during the on-site review that is not given below or discussed during the upcoming conference call that will be held, if requested by the modeler. One goal of the potential conference call is to clarify points in this letter. The comments are grouped by Standards sections. The overall intent is to expedite the on-site review and to avoid last minute preparations that could just as easily have been handled earlier.

The items provided below are to assist the modeler in preparing for the on-site review. Some of this material may have been shown or been available on a previous visit by the Professional Team. The Professional Team will also be considering material in response to the Commission's designation(s) of deficiencies and issues.

The goal of the Professional Team on-site review is to provide the Florida Commission on Hurricane Loss Projection Methodology (Commission) with a clear and thorough report of the model, subject to non-disclosure restrictions on proprietary information. All modifications, adjustments, assumptions, or other criteria that were included in producing the information requested by the Commission in the submission should be disclosed and will be reviewed.

It is important that all material prepared for presentation during the on-site review, be presented using a medium that is readable by all members of the Professional Team simultaneously. The Professional Team will review selected computer code in conjunction with the reviews performed for each section. Computer code should be available in a format that will allow simultaneous visualization by the entire Professional Team. Access to critical articles or materials referenced in the submission or during the on-site review should be available on-site for the Professional Team. The Professional Team should be provided access to an internet connection through one of the Professional Team member computers for reference work that may be required while on-site.

The Professional Team will interview the individuals signing the Expert Certification Forms G-1 through G-7.

Provide for the Professional Team's review, all engineering data (post event surveys, tests, etc.) received since 2005. Describe any processes used to amend or validate the model that incorporates this engineering data. Describe any processes used to amend or validate the model that incorporates insurance company claims data covering the 2004 and 2005 hurricane seasons, especially processes used since the prior visit by the Professional Team.
Provide and describe all studies performed to determine whether the model meets the "probable maximum loss" requirements added to the standards in the 2008 Report of Activities (Standard A-11 and several other standards and forms).

Provide an explanation for each loss cost change of more than 5% from the loss costs produced in the previous submission using the 2007 Florida Hurricane Catastrophe Fund (FHCF) exposure data to the corresponding loss costs produced in the current submission.

Demonstrate that output reports produced by a user of the model reveal the values of all user inputs and selections used to run the model.

When the Professional Team arrives on-site, provide the electronic file used to complete Form V-3 on a removable drive medium. This material will be used during the on-site review and will be returned when the on-site review is complete.

For your information, the Professional Team will arrive in business casual attire.

ISSUES:

Describe how the model incorporates number of stories in the vulnerability functions.

Discuss the development and application of mitigation credits for various parts of the state, by region (North, Central and South), and by proximity to water (Coastal and Inland) as defined in Form A-7. Expansion to structure types that resemble the actual Florida building stock is desired.

TRADE SECRET MATERIAL:

Describe how the model determines the magnitude of demand surge to include in the calculation of loss costs and probable maximum loss levels.

Show the Professional Team "supportive design diagrams, equations, and pseudo-code" that you intend to show the Commission during the closed meeting portion of the modeler presentation.

GENERAL STANDARDS – Mark Johnson, Leader

G-1 Scope of the Computer Model and Its Implementation*

*(*Significant Revision)*

The computer model shall project loss costs and probable maximum loss levels for personal lines residential property insured damage from hurricane events.

Audit

1. The main intent of the audit is to determine the capabilities of the model and to assess its implementation for purposes of Florida projected insured loss costs and probable maximum loss levels. Copies of all representative or primary technical papers that describe the underlying model theory shall be made available.

2. All software located within the model, used to compile data used by the model, used to validate the model, and used to project model loss costs and probable maximum loss levels (1) fall within the scope of the Computer Standards, and (2) will be reviewed interactively (viewed simultaneously by all Professional Team members in conjunction with the review of each Standard).

3. Databases or data files relevant to the modeler's submission will be reviewed.

Trade Secret Information to be presented to the Professional Team (page 8):

- G-1 – Computer model code, databases and files relevant to the submission.

Verified: YES

Professional Team Comments:

Reviewed the updates to the event generation module and the ZIP Code database in detail.

G-2 Qualifications of Modeler Personnel and Consultants*

*(*Significant Revision)*

A. Model construction, testing, and evaluation shall be performed by modeler personnel or consultants who possess the necessary skills, formal education, and experience to develop the relevant components for hurricane loss projection methodologies.

B. The model or any modifications to an accepted model shall be reviewed by either modeler personnel or consultants in the following professional disciplines: structural/wind engineering (licensed Professional Engineer), statistics (advanced degree), actuarial science (Associate or Fellow of Casualty Actuarial Society), meteorology (advanced degree), and computer/information science (advanced degree). These individuals shall be signatories on Forms G-1 through G-6 as applicable and shall abide by the standards of professional conduct if adopted by their profession.

Audit

1. The professional vitae of modeler personnel and consultants responsible for the current model and information on their predecessors if different than current personnel will be reviewed. Background information on individuals providing testimonial letters in the submission shall be provided.

2. Forms G-1, G-2, G-3, G-4, G-5, G-6, and all independent peer reviews of the model under consideration will be reviewed. Signatories on the individual Forms will be required to provide a description of their review process.

3. Discuss any incidents where modeler personnel or consultants have been found to have failed to abide by the standards of professional conduct adopted by their profession.

Pre-Visit Letter

1. G-2, Disclosure 2.B, page 39: Provide the resumes of the four new employees (Nicholas Lamparelli, Scott Stransky, Kiran Lilam, and Tyler Maxwell).

2. G-2, Disclosure 3.A, page 41 (Attachment C, page 359): Discuss the independent nature of the peer review by Tyler Maxwell given that Maxwell is employed by AIR and was the signatory on Form G-6.

The Professional Team will interview the individuals signing the Expert Certification Forms G-1 through G-7.

Verified: YES

Professional Team Comments:

Discussed changes in personnel and personnel responsibilities involved in the modeling process.

Reviewed resumes of new personnel:

- Laxmi Balcha, M.S. Software Engineering, Brandeis University; B.S. Electronics and Communications Engineering, Osmania University
- Todd J. Keller, B.S. Earth and Geographic Sciences, University of Massachusetts Boston, Boston, MA
- Bethany Kocher, M.S. Meteorology, Florida State University, Tallahassee, FL; B.S. Mathematics, University of South Florida, Tampa, FL
- Venkata Kiran Lalam, M.S. in Electrical and Computer Engineering, Tennessee State University, Nashville, TN; B.Tech in Electronics and Instrumentation Engineering, Nagarjuna University, India
- Nicholas Lamparelli, B.S. Biological Sciences, University of Massachusetts
- Ellen C. Langhans, B.A. in Communications, Simmons College, Boston, MA
- Guillermo A. Leiva, Civil and Structural Engineering Degree, Pontificia Catholic University of Chile; M.S. Mathematical Sciences, Carnegie Mellon University, PA
- Morgan Tyler Maxwell, M.S. Computer Science, University of Massachusetts Amherst; B.S.E. Computer Engineering, University of South Carolina
- Glenn P. Rivard, B.S. Mechanical Engineering, University of Hartford, Hartford, CT
- Scott Stransky, M.S. Atmospheric Science, Massachusetts Institute of Technology, Cambridge, MA; B.S. Mathematics with Computer Science and Minors in Earth, Atmospheric and Planetary Science and Music, Massachusetts Institute of Technology, Cambridge, MA

Discussed Tyler Maxwell's affiliation with AIR and his involvement with the model review process.

*****Additional Verification Review Comments*****

Reviewed updated Actuarial Standards Expert Certification Form G-4.

G-3 Risk Location

A. ZIP Codes used in the model shall be updated at least every 24 months using information originating from the United States Postal Service. The United States Postal Service issue date of the updated information shall be reasonable.

B. ZIP Code centroids, when used in the model, shall be based on population data.

C. ZIP Code information purchased by the modeler shall be verified by the modeler for accuracy and appropriateness.

Audit

1. Provide geographic displays for all ZIP Codes. The location of specific centroids will be reviewed.

2. Provide the third party vendor, if applicable, and a complete description of the process used to validate ZIP Code information.

3. The treatment of ZIP Code centroids over water or other uninhabitable terrain will be reviewed.

Pre-Visit Letter

3. G-3.C, page 43: Provide material that supports the correctness of the population centroid locations.

Trade Secret Information to be presented to the Professional Team (page 8):

- G-3 – Visual representation of the reasonableness of the population-weighted ZIP Code centroids, ZIP Code validation and update process document

Verified: YES

Professional Team Comments:

Reviewed the process for updating and validating the population-weighted centroids.

Reviewed examples of ZIP Code centroid comparisons between AIR calculated centroids and data obtained from vendor.

Reviewed centroid comparisons from previous year to current modelable ZIP Codes including quantitative analyses of centroid movements greater than 1 mile and ZIP Code boundary changes.

Reviewed ZIP Code centroids located over water and their treatment in the model.

Reviewed maps of centroids in the model covering every county in the state.

G-4 Independence of Model Components

The meteorological, vulnerability, and actuarial components of the model shall each be theoretically sound without compensation for potential bias from the other two components.

Audit

1. Demonstrate that the model components adequately portray hurricane phenomena and effects (damage, loss costs, and probable maximum loss levels). Attention will be paid to an assessment of (1) the theoretical soundness of each component and (2) the basis of their integration. For example, a model would not meet this Standard if an artificial calibration adjustment had been made to improve the match of historical and model results for a specific hurricane.

2. Describe all changes in the model since the previous submission that might impact the independence of the model components.

Verified: YES

Professional Team Comments:

There was no evidence to suggest that one component of the model was artificially adjusted to compensate for another component.

G-5 Editorial Compliance*

*(*Significant Revision due to new Audit language)*

The submission and any revisions provided to the Commission throughout the review process shall be reviewed and edited by a person or persons with experience in reviewing technical documents who shall certify on Form G-7 that the submission has been personally reviewed.

Audit

1. Demonstrate that the person or persons who have reviewed the submission has had experience in reviewing technical documentation and such person or persons is familiar with the submission requirements as set forth in the Commission's *Report of Activities as of November 1, 2008*.

2. Describe all changes to the submission document since the prior year's submission that might impact the final document submission.

3. Demonstrate that the modeler submission has been reviewed for grammatical correctness, typographical accuracy, completeness, and inclusion of extraneous data or materials.

4. The modification history for submission documentation will be reviewed.

5. A flowchart defining the process for Form creation will be reviewed.

6. Form G-7 will be reviewed.

Pre-Visit Letter

4. G-5, Audit item 5 from page 73 of Report of Activities: Provide the flowchart used for Form creation.

The Professional Team will interview the individuals signing the Expert Certification Forms G-1 through G-7.

Verified: YES

Professional Team Comments:

Reviewed flowchart describing submission form creation. Discussed reasons for discrepancy in the output ranges Form A-6 provided in the printed submission document and the electronic version. Discussed changes to process and revised flowchart to help eliminate this type of error from occurring in the future.

Reviewed manual process in producing Form A-3 and discussed reasons for the error in originally generating Form A-3. Reviewed revised flowchart for Form A-3 generation.

Re-reviewed process in generating Form A-3 to ensure correct implementation of storm set updates to reflect HURDAT reanalyses.

Discussed with Ellen Langhans her process for editorial review.

Editorial items noted by the Professional Team were satisfactorily addressed during the audit. The Professional Team has reviewed the submission per Audit item 3, but cannot guarantee that all editorial difficulties were identified. The modeler is responsible for eliminating such errors.

*****Additional Verification Review Comments*****

Reviewed updated Editorial Certification Form G-7.

Meteorological Standards – Jenni Evans, Leader

M-1 Base Hurricane Storm Set*

*(*Significant Revision)*

A. Annual frequencies used in the model and model validation shall be based upon the National Hurricane Center HURDAT starting at 1900 as of June 1, 2008 (or later). Complete additional season increments based on updates to HURDAT approved by the Tropical Prediction Center/National Hurricane Center are acceptable modifications to these storm sets. Peer reviewed atmospheric science literature can be used to justify modifications to the Base Hurricane Storm Set.

B. Any trends, weighting or partitioning shall be justified and consistent with currently accepted scientific literature and statistical techniques. Validation and comparison shall encompass the complete Base Hurricane Storm Set as well as any partitions.

Audit

1. The modeler's Base Hurricane Storm Set will be reviewed.

2. Reasoning and justification underlying any modification by the modeler to the Base Hurricane Storm Set will be reviewed.

3. Reasoning and justification underlying any short-term and long-term variations in annual storm frequencies incorporated in the model will be reviewed.

4. Modeled probabilities will be compared with observed hurricane frequency using methods documented in currently accepted scientific literature. The goodness-of-fit of modeled to historical hurricane frequencies for the four regions of Florida and overall as provided in Form M-1 will be reviewed.

5. Form M-1 will be reviewed for consistency with Form S-1.

6. Comparisons of modeled probabilities and characteristics from the complete historical record will be reviewed. Modeled probabilities from any subset, trend, or fitted function will be reviewed, compared, and justified against the complete historical record. In the case of partitioning, modeled probabilities from the partition and its complement will be reviewed and compared with the complete historical record.

Pre-Visit Letter

5. Form M-1, page 79: Discuss the change in landfall frequencies for Region D, Category 1-3 storms compared to the previous submission.

Trade Secret Information to be presented to the Professional Team (page 8):

- M-1 – Updates to the historical storm set

Verified: YES

Professional Team Comments:

Verified that the June 2008 version of HURDAT for years 1900-2007 was incorporated for Florida and adjacent states. Discussed adjustments to the database for landfall locations only.

Confirmed that no differential weighting or partitions were used in developing the historical landfall frequency by category.

Discussed the increase in modeled landfall frequencies for Form M-1, Region D due to the addition of storm NoName1 in 1915 to the historical catalog as a result of the HURDAT reanalysis for the period 1915 to 1920.

Reviewed storm totals from Form M-1 for consistency with Form S-1.

Reviewed hurricane landfall location histogram comparison for historical (2007 Report of Activities versus 2008) and modeled (2007 versus 2008) storms. Discussed reasonableness of changes based on HURDAT update.

M-2 Hurricane Parameters and Characteristics

Methods for depicting all modeled hurricane parameters and characteristics, including but not limited to windspeed, radial distributions of wind and pressure, minimum central pressure, radius of maximum winds, strike probabilities, tracks, spatial and time variant windfields, and conversion factors, shall be based on information documented in currently accepted scientific literature.

Audit

1. All hurricane parameters used in the model will be reviewed.

2. Prepare graphical depictions of hurricane parameters as used in the model. Describe and justify:
   - the data set basis for the fitted distributions,
   - the modeled dependencies among correlated parameters in the windfield component and how they are represented,
   - the asymmetric nature of hurricanes,
   - the fitting methods used and any smoothing techniques employed.

3. The goodness-of-fit of distributions to historical data will be reviewed.

4. The treatment of uncertainties associated with the conversion of gradient winds to surface winds will be compared with currently accepted literature. Variation of the conversion factor with storm intensity will be reviewed.

5. All modeler cited scientific literature provided in Standard G-1 will be reviewed to determine applicability.

6. All external data sources that affect model generated windfields will be identified and their appropriateness will be reviewed.

7. Describe the value(s) of the far-field pressure used in the model and approximate its sensitivity on the average annual zero deductible statewide loss costs.

Pre-Visit Letter

6. M-2, Disclosure 1, page 57: Discuss the time period in Table 2 for forward speed and storm heading at landfall.

7. M-2, Disclosure 2, page 58: Justify the continued use of the NWS-23 windfield. See also Standard M-4, Disclosure 3 on page 68.

8. M-2, Disclosure 2, page 60: Discuss the use of a single Gradient Wind Reduction Factor on the NWS-23 windfield.

9. M-2, Disclosure 6, page 61: Discuss the specific reference(s) used in the 10-minute to 1-minute conversion and the "land use reduction factor" separately. See also Standard M-4, Disclosure 4 on page 68.

Trade Secret Information to be presented to the Professional Team (page 8):

- M-2 – Methods for depicting all modeled hurricane characteristics and goodness-of-fit tests. Comparison of observed and modeled hurricane parameters and wind speeds.

Verified: YES

Professional Team Comments:

Clarified the time period in Table 2 for forward speed, storm heading at landfall, and storm track. Submission language under G-1, Disclosure 2 and Table 2 revised for consistency. Probability distributions for forward speed and landfall angle were developed using historical data for the period 1900-2001. These probability distributions were compared to the historical data in HURDAT for the period 1900-2007.

Reviewed graphical comparison of historical versus simulated for forward speed and frequency.

Reviewed graphical comparisons of radial wind profile comparing Willoughby and NWS-23 gradient level wind profiles for a variety of storm parameter combinations.

Discussed the justification for the continued use of the NWS-23 windfield. Reviewed validation for wind observations comparing the existing model using NWS-23 and Willoughby. The assessment has identified areas where model performance can be improved. AIR stated an update to the windfield model will be incorporated in next year's submission.

Reviewed model formulation for gradient windspeed, gradient reduction factor, radial decay, and inland decay as well as adjustments for averaging time, translation, and friction.

Reviewed analysis of dropsonde data comparing flight level to surface level wind as a function of distance from the center of the storm.

Discussed equations and material drawn from the Simiu and Scanlan reference. Reviewed equations for converting 10-minute to 1-minute winds.

Discussed the far field pressure value used in the model.

M-3 Hurricane Probabilities

A. Modeled probability distributions of hurricane parameters and characteristics shall be consistent with historical hurricanes in the Atlantic basin.

B. Modeled hurricane probabilities shall reflect the Base Hurricane Storm Set used for category 1 to 5 hurricanes and shall be consistent with those observed for each coastal segment of Florida and neighboring states (Alabama, Georgia, and Mississippi).

Audit

1. Demonstrate that the quality of fit extends beyond the Florida border by showing results for appropriate coastal segments in Alabama, Georgia, and Mississippi.

2. Describe and support the method of selecting stochastic storm tracks.

3. Describe and support the method of selecting storm track strike intervals. If strike locations are on a discrete set, show the landfall points for major metropolitan areas in Florida.

4. Provide any modeler specific research performed to develop the functions used for simulating model variables or to develop databases.

Verified: YES

Professional Team Comments:

Confirmed adjustments to landfall frequency and location databases based on revised 1916 storm.

Reviewed the methodology for selecting stochastic storm tracks, the storm track strike intervals, and continuity with adjacent states.

Reviewed quality of fits for adjacent states. Reviewed map of 100-mile coastal segments. Reviewed modeled central pressure comparisons for adjacent states.

Confirmed that the probability distributions of hurricane parameters were derived from the complete set of landfalling storms. If partitioning was performed, it related only to landfall location or given HURDAT intensity.

Discussed characteristics of most intense stochastic event compared to historical storms. Clarified that this storm need not produce the largest loss due to exposure distributions.

M-4 Hurricane Windfield Structure

A. Windfields generated by the model shall be consistent with observed historical storms affecting Florida.

B. The translation of land use and land cover or other source information to geographic surface roughness distribution shall be consistent with current state-of-the-science.

Audit

1. Provide any modeler-specific research performed to develop the windfield functions used in the model. Identify the databases used.

2. Provide any modeler-specific research performed to derive the roughness distributions for Florida and adjacent states.

3. The spatial distribution of surface roughness used in the model will be reviewed.

4. Identify other variables in the model that affect over-land surface windspeed estimation.

5. Provide detailed comparisons of the model windfield with Hurricane Charley (2004), Hurricane Katrina (2005), and Hurricane Wilma (2005).

6. For windfield and/or pressure distributions not previously reviewed, the modeler will present time-based contour animations (capable of being paused) to demonstrate scientifically reasonable windfield characteristics.

7. Form M-2 will be reviewed.

Pre-Visit Letter

10. M-4, Disclosure 1, page 67: Provide examples of the cited windfield validation for a number of Florida storms in the 1980 through 2005 period. At least some members of this storm set should differ from the previous on-site review.

11. M-4, Disclosure 4, page 68: Be specific about how each reference is used. As stated in Table 3 on page 66, this is a public component of the model.

12. M-4, Disclosure 8, page 70: Discuss the methodology used to produce Figure 7 and the results therein.

Trade Secret Information to be presented to the Professional Team (page 8):

- M-4 – Documentation of wind speed validation

Verified: YES

Professional Team Comments:

Discussed in detail the applicability of the NWS-23 windfield. Reviewed spatial representation of modeler analyses of Hurricane Dennis (2005), Hurricane Charley (2004), Hurricane Erin (1995), and Hurricane Jeanne (2004) windfields as represented in the model.

AIR stated that along with the implementation of a new model windfield formulation, the land use land cover database will be updated next year.

Discussed the source for storm parameters. Discussed the validation process for data from observation records. Discussed the treatment of outliers.

Discussed the methodology used to produce Figure 7 (page 70), observed and modeled windspeeds for Hurricane Dennis (2005) and Hurricane Charley (2004). Confirmed that windfield specification is the same as used for stochastic storms, with the exception that observed storm parameters are specified.

Discussed conclusions drawn from Hurricane Jeanne (2004) comparison of modeled versus observed winds where the modeled winds are 10-20 mph higher than the actual observed winds. Discussed presence of discrepancies even when co-located model and observation comparisons were made.

Verified no change in the derivation of roughness distributions; however, roughness factors may change slightly due to ZIP Code updates resulting in small centroid shifts.

Reviewed ZIP Code centroid for Hurricane Dennis (2005) landfall in 91-100 mph region in Figure 7 (page 70). Reviewed gradient level wind profile comparisons of Willoughby and NWS-23 radial profiles for Hurricane Dennis (2005) at landfall. Reviewed Hurricane Dennis (2005) windspeed map at the ZIP Code level.

Reviewed validation analyses of modeled versus observed damage ratio for Hurricane Charley (2004) with current model windfield and research windfield.

Discussed graphical results in Form M-2 for comparisons between actual and open terrain maps in regions with observed open terrain. Reviewed roughness and windfield maps at finer contour intervals to confirm reasonableness of results in the Form.

Discussed the process used to generate the maps contained in Form M-2.

Reviewed contour maps of friction factor values at higher resolution using an east coast landfall. Reviewed contour maps of 250-year stochastic and historical storm sets for both actual and open terrain (Form M-2).

Discussed comparisons of modeled winds co-located with observation sites. Discussed timing mismatch as potential source of some discrepancies.

M-5 Landfall and Over-Land Weakening Methodologies

A. The magnitude of land friction coefficients shall incorporate current geographic surface roughness distributions and shall be implemented with appropriate geographic information system data.

B. The hurricane over-land weakening rate methodology used by the model shall be consistent with historical records.

C. Models shall use maximum one-minute sustained 10-meter windspeed when defining hurricane landfall intensity. This applies both to the Base Hurricane Storm Set used to develop landfall strike probabilities as a function of coastal location and to the modeled winds in each hurricane which causes damage. The associated maximum one-minute sustained 10-meter windspeed shall be within the range of windspeeds (in statute miles per hour) categorized by the Saffir-Simpson Scale.

Saffir-Simpson Hurricane Scale:

Category	Winds (mph)	Damage
1	74 – 95	Minimal
2	96 – 110	Moderate
3	111 – 130	Extensive
4	131 – 155	Extreme
5	Over 155	Catastrophic

Audit

1. Describe the variation in over-land decay rates used in the model.
2. Comparisons of the model's weakening rates to weakening rates for historical Florida hurricanes will be reviewed.
3. Transition of winds from over-water to over-land (i.e., landfall) will be reviewed.

Pre-Visit Letter

13. M-5.A, page 73: Discuss the methodology used to produce Figure 8 and the results therein.
14. M-5, Disclosure 1, page 75: Discuss the regional variation of V_h.

15. M-5, Disclosure 2, page 75: Discuss the methodology used to produce Figure 10 and the results therein.

16. M-5, Disclosure 3, page 76: Discuss the windspeed adjustment near the coast.

Trade Secret Information to be presented to the Professional Team (page 8):

- M-5 – Documentation of methodology for smoothing landfalls and goodness-of-fit tests. Maps depicting land friction effects. Comparisons of observed and modeled wind speeds showing how winds are spatially distributed.

Verified: YES

Professional Team Comments:

Discussed the methodology used to produce Figure 8 (page 73), windspeeds and friction factors for a simulated Panhandle storm.

Discussed the methodology used to produce Figure 10 (page 75), actual and modeled filling rates for all 2004 and 2005 hurricanes. Reviewed equivalent figures for each storm individually.

Reviewed the windspeed adjustment for locations near the coastline which is a function of distance to the coastline.

Verified no change in methodology for transition of winds from over-water to over-land.

Verified no change in methodology for smoothing landfalls and goodness-of-fit tests.

Reviewed maps depicting land friction effects.

Reviewed comparisons of observed and modeled windspeeds depicting the spatial distribution of winds.

Reviewed MapInfo natural neighbor interpolation procedure.

Discussed application of the Cook and ESDU references. Reviewed land use reduction factor equations used to adjust windspeeds due to the impact of friction for various surface roughness.

Reviewed the spatial distribution of surface roughness. AIR stated they will have an updated land use land cover database incorporated next year.

M-6 Logical Relationships of Hurricane Characteristics

A. The magnitude of asymmetry shall increase as the translation speed increases, all other factors held constant.

B. The mean windspeed shall decrease with increasing surface roughness (friction), all other factors held constant.

Audit

1. Form M-3 and the modeler's sensitivity analyses provide the information used in auditing this Standard.

2. Justify the relationship between central pressure and radius of maximum winds.

Pre-Visit Letter

17. Form M-3, page 87: Justify the upper bound for Rmax in Figure 16.

Trade Secret Information to be presented to the Professional Team (page 8):

- M-6 – Sensitivity analyses

Verified: YES

Professional Team Comments:

Reviewed Form M-3 and scatter plots of Rmax. Discussed different approaches to compiling table and plot based on interpretation of Commission instructions.

Reviewed scatter plot in support of decline in Rmax maximum values around pmin=960mb.

VULNERABILITY STANDARDS – Masoud Zadeh, Leader

V-1 Derivation of Vulnerability Functions

A. Development of the vulnerability functions is to be based on a combination of the following: (1) historical data, (2) tests, (3) structural calculations, (4) expert opinion, or (5) site inspections. Any development of the vulnerability functions based on structural calculations or expert opinion shall be supported by tests, site inspections, and historical data.

B. The method of derivation of the vulnerability functions shall be theoretically sound.

C. Any modification factors/functions to the vulnerability functions or structural characteristics and their corresponding effects shall be clearly defined and be theoretically sound.

D. Construction type and construction characteristics shall be used in the derivation and application of vulnerability functions.

E. In the derivation and application of vulnerability functions, assumptions concerning building code revisions and building code enforcement shall be justified.

F. Vulnerability functions shall be separately derived for building structures, mobile homes, appurtenant structures, contents, and additional living expense.

G. The minimum windspeed that generates damage shall be reasonable.

Audit

1. Historical data shall be available in the original form with explanations for any changes made and descriptions of how missing or incorrect data were handled. To the extent that historical data are used to develop vulnerability functions, demonstrate the goodness-of-fit of the data to fitted models. Complete reports detailing loading conditions and damage suffered are required for any test data used. Complete structural calculations shall be presented so that a variety of different structure types and construction characteristics may be selected for review. The basis for expert opinion and original site inspection reports shall be available for review.

2. Copies of any papers, reports, and studies used in the development of the vulnerability functions shall be available for review. Copies of all public record documents used may be requested for review.

3. Multiple samples of vulnerability functions for building structures, mobile homes, appurtenant structures, contents, and additional living expense shall be available. The magnitude of logical changes among these items for a given windspeed shall be explained and validation materials shall be available.

4. Justify the construction types and characteristics used, and provide validation of the range and direction of the variations in damage.

5. Document and justify all modifications to the vulnerability functions due to building codes and their enforcement. If age of building is used as a surrogate for building code and code enforcement, provide complete supporting information for the number of age groups used as well as the year(s) of construction that separates particular group(s).

6. Provide validation material for the disclosed minimum windspeed. Provide the computer code showing the inclusion of the minimum windspeed at which damage occurs.

7. The effects on building vulnerability from local construction characteristics and building codes will be reviewed.

8. Form V-1 will be reviewed.

Pre-Visit Letter

18. V-1.E, page 89, second paragraph: Discuss the relationship of the unique building categories to the basic 20 different residential construction types cited on top of page 89.

19. V-1, Disclosure 2, page 91: The exposure values of $600 billion and $6 billion in the first paragraph have not changed since the 2005 submission under the 2004 Standards. Explain how these figures are still correct in light of the more recent data mentioned in paragraph 6.

20. V-1, Disclosure 2, page 91: Discuss analysis of recently received claims data from 2004 and 2005 Florida storms.

From preamble: Provide for the Professional Team's review, all engineering data (post event surveys, tests, etc.) received since 2005. Describe any processes used to amend or validate the model that incorporates this engineering data. Describe any processes used to amend or validate the model that incorporates insurance company claims data covering the 2004 and 2005 hurricane seasons, especially processes used since the prior visit by the Professional Team.

21. V-1, Disclosure 4, page 97: Discuss the methods used to relate windspeed and duration to damage in storm surveys.

22. V-1, Disclosure 6, page 99 (new this year): Discuss in detail how the model considers regional variations in construction and building codes. Describe the process of examining the building code revisions and enforcement and their impact

on the vulnerability model, including Florida Building Code Revisions 2001, 2004, and their supplements/amendments.

ISSUE:
Describe how the model incorporates number of stories in the vulnerability functions.

Trade Secret Information to be presented to the Professional Team (page 8):
- V-1 – Original client data, samples of vulnerability functions, modifications to the vulnerability functions due to building codes, computer code showing minimum wind speed at which damage occurs

Verified: YES

Professional Team Comments:

Discussed with Dr. Joseph Minor his independent review of the Vulnerability Standards, the Vulnerability Forms, and the vulnerability functions within the model.

Reviewed the process and results from recent damage surveys of Hurricane Ike (2008) and Hurricane Gustav (2008). Reviewed the damage survey folders. Reviewed correspondence with clients requesting exposure and claims data. Discussed the process used to review the vulnerability of the affected areas.

Discussed how the update to the windfield model may necessitate an update to the vulnerability function calculations.

Discussed the total amount of insurance data, number of companies, and occupancy available to AIR, upon which the corresponding information in the submission was updated.

Verified new claims data from 2005 storms collected in 2008 is being analyzed, but has not been used to update the vulnerability functions due to ongoing claims development.

Reviewed loss comparisons for total losses by company and by coverage types for Hurricane Charley (2004), Hurricane Frances (2004), Hurricane Ivan (2004), and Hurricane Jeanne (2004).

Reviewed how the current model treats number of stories in the vulnerability functions and AIR's analysis of data to understand the effect of number of stories on building vulnerability. Reviewed model treatment of commercial residential structures. This information will be presented to the Commission during the Trade Secret session in response to the issue identified by the Commission at the March 19, 2009 meeting.

Discussed the relationship of the six unique building regions for post-2001 built buildings to the twenty different residential construction types which represent base damage functions for a residential occupancy. Different vulnerability functions are assigned based on the 2001 Florida Building Code requirements for each of the six unique regions.

Discussed regional variation of post-2001 Florida Building Code constructions via review of Hurricane Individual Risk Methodology document given in Attachment D of the submission.

Reviewed the methodology to relate windspeed and duration to damage in storm surveys. Reviewed plots of mean damage ratio at different duration levels.

Reviewed the process of examining building code revisions and enforcement. AIR stated they are currently reviewing the latest changes in the Florida Building Code in 2006.

Reviewed how the model considers regional variations in construction and building codes prior to 2001. Damage functions vary by type of construction and four regions.

Documentation reviewed:

Hurricane Gustav Damage Survey 09/01/08

V-2 Mitigation Measures

A. Modeling of mitigation measures to improve a structure's wind resistance and the corresponding effects on vulnerability shall be theoretically sound. These measures shall include fixtures or construction techniques that enhance:

- ***Roof strength***
- ***Roof covering performance***
- ***Roof-to-wall strength***
- ***Wall-to-floor-to-foundation strength***
- ***Opening protection***
- ***Window, door, and skylight strength.***

B. Application of mitigation measures shall be empirically justified both individually and in combination.

Audit

1. Forms V-2 and V-3 provide the information used in auditing this Standard.

2. Individual mitigation measures as well as their effect on damage due to use of multiple mitigation measures will be reviewed. Any variation in the change over the range of windspeeds for individual and multiple mitigation measures will be reviewed.

3. Mitigation measures used by the model that are not listed as required in this Standard will be disclosed and shown to be theoretically sound and reasonable.

Pre-Visit Letter

When the Professional Team arrives on-site, provide the electronic file used to complete Form V-3 on a removable drive medium. This material will be used during the on-site review and will be returned when the on-site review is complete.

23. Form V-2, pages 110-114: Explain the relationships among values in Form V-2 and Table 8. For example, values for frame structure hip roof in Form V-2 are 13.7, 17.2, 15.7, 10.8, and 6.2, and in Table 8 the comparable values are 13.7, 17.2, 15.7, 10.8, and 7.8. Provide different sets of modification factors for other building types and occupancies, similar to Table 8, if any. Explain an average/base building and how these modification factors are applied to, for example, for the age of built roof.

ISSUE:
Discuss the development and application of mitigation credits for various parts of the state, by region (North, Central and South), and by proximity to water (Coastal and Inland) as defined in Form A-7. Expansion to structure types that resemble the actual Florida building stock is desired.

Trade Secret Information to be presented to the Professional Team (page 8):
- V-2 – Source data and methodology used to reflect impact of mitigation factors; Form V-3

Verified: YES

Professional Team Comments:

Reviewed the development and application of mitigation credits. Reviewed spatial representation of the vulnerability in AIR's Florida Building Code Zones for pre-2002 year built structures. Reviewed the major changes to the new Florida Building Code 2001. This information will be presented to the Commission during the Trade Secret session in response to the issue identified by the Commission at the March 19, 2009 meeting.

Reviewed Form V-3. After identification of missing modification factor (metal roof) from the file provided on-site, reviewed correct Form V-3 file and confirmed consistency between Form V-3 and the submitted Form V-2.

Recognized that the values in Table 8, column 160 mph actually corresponded to 150 mph. Reviewed the corrected Table 8. Confirmed that Form V-2 was completed correctly from Form V-3.

Discussed the process for generating Forms V-2 and V-3.

ACTUARIAL STANDARDS – Marty Simons, Leader

A-1 Modeled Loss Costs and Probable Maximum Loss Levels*

*(*Significant Revision)*

Modeled loss costs and probable maximum loss levels shall reflect all insured wind related damages from storms that reach hurricane strength and produce minimum damaging windspeeds or greater on land in Florida.

Audit

1. The model will be reviewed to determine that the definition of an event in the model is consistent with Standard A-1.

2. The model will be reviewed to determine that by-passing storms and their effects are considered in a manner that is consistent with Standard A-1.

Pre-Visit Letter

24. A-1, Disclosure 2, page 116 (new this year): Provide details (including data used) regarding the process described related to the appropriate accounting for preceding flood or hurricane storm surge.

25. A-1, Disclosure 3, page 116 (new this year): In conjunction with the response to Disclosure 2 above, provide additional details regarding this response.

Verified: YES

Professional Team Comments:

Verified no change in the definition of an event or a by-passing storm.

Reviewed the process for selecting by-passing storms from the North Atlantic Storm catalog.

Discussed the storm surge model which is separate from the wind model and is run in parallel with the wind model.

Reviewed analysis log showing storm surge is not included in the output results. Verified storm surge is not used in any results calculated for the Commission.

Verified there was no explicit inclusion of storm surge in the output ranges submitted to the Commission.

Discussed basis for ensuring storm surge damage is not included in the wind damage. Modeled mean damage ratio is based on the wind load applied to the building.

Continuous analysis of claims data and validation that all losses paid by company are wind losses and are included in the claim files used for development and validation.

Reviewed comparison of observed versus modeled losses from Hurricane Andrew (1992) in Monroe County.

Reviewed and discussed insurance company claims data for Monroe County from Hurricane Andrew (1992).

A-2 Underwriting Assumptions*

*(*Significant Revision)*

A. When used in the modeling process or for verification purposes, adjustments, edits, inclusions, or deletions to insurance company input data used by the modeler shall be based upon accepted actuarial, underwriting, and statistical procedures.

B. For loss cost and probable maximum loss level estimates derived from or validated with historical insured hurricane losses, the assumptions in the derivations concerning (1) construction characteristics, (2) policy provisions, (3) claim payment practices, and (4) relevant underwriting practices underlying those losses, as well as any actuarial modifications, shall be appropriate.

Audit

1. Demonstrate how the claim practices of insurance companies are accounted for when claims data for those insurance companies are used to develop or to verify model calculations. For example, the level of damage the insurer considers a loss to be a "total loss" or claim practices of insurers with respect to concurrent causation.

Verified: YES

Professional Team Comments:

Discussed methodology for reviewing claims payment practices of insurance companies.

A-3 Loss Cost Projections and Probable Maximum Loss Levels*

*(*Significant Revision)*

A. Loss cost projections and probable maximum loss levels produced by hurricane loss projection models shall not include expenses, risk load, investment income, premium reserves, taxes, assessments, or profit margin.

B. Loss cost projections and probable maximum loss levels shall not make a prospective provision for economic inflation.

C. Loss cost projections and probable maximum loss levels shall not include any provision for direct hurricane storm surge losses.

Audit

1. Describe how the model handles expenses, risk load, investment income, premium reserves, taxes, assessments, profit margin, and economic inflation.

Verified: YES

Professional Team Comments:

Verified modeled loss costs do not include expenses, risk load, investment income, premium reserves, taxes, assessments, or profit margin, and the model does not make a prospective provision for economic inflation.

A-4 Demand Surge*

*(*Significant Revision)*

A. Demand surge shall be included in the model's calculation of loss costs and probable maximum loss levels using relevant data.

B. The methods, data, and assumptions used in the estimation of demand surge shall be actuarially sound.

Audit

1. Provide the data and methods used to incorporate individual aspects of demand surge on each coverage type, inclusive of the effects from building material costs, labor costs, contents costs, repair time, etc.

2. All referenced literature will be reviewed to determine applicability.

Pre-Visit Letter

TRADE SECRET MATERIAL: Describe how the model determines the magnitude of demand surge to include in the calculation of loss costs and probable maximum loss levels.

Trade Secret Information to be presented to the Professional Team (page 8):

- A-4 – Demand Surge Analysis

Verified: YES

Professional Team Comments:

Verified no change in the methodology for demand surge calculations from the previous year.

Discussed the methodology for determining the magnitude of demand surge in the calculation of probable maximum loss levels.

Reviewed white paper, AIR U.S. Demand Surge Function, March 2008.

A-5 User Inputs

All modifications, adjustments, assumptions, and defaults necessary to use the inputs in the model shall be actuarially sound and included with the model output. Treatment of missing values for user inputs required to run the model shall be actuarially sound and described with the model output.

Audit

1. Quality assurance procedures shall include methods to assure accuracy of insurance data. Compliance with this Standard will be readily demonstrated through documented rules and procedures.

2. All insurer inputs and assumptions will be reviewed.

Trade Secret Information to be presented to the Professional Team (page 8):

- A-5 – User Inputs

Information to be presented to the Professional Team:

- A-5.2, page 126 – A copy of the Preparer's Guide will be available to the Professional Team during its on-site visit. A copy of the User's Guide will be available to the Professional Team during its on-site visit.

Pre-Visit Letter

Demonstrate that output reports produced by a user of the model reveal the values of all user inputs and selections used to run the model.

Verified: YES

Professional Team Comments:

Discussed how analysis log discloses all selections used by the user of the model. Verified the analysis log is generated every time the model is run. An example analysis log is provided as Attachment A in the submission.

Reviewed the Unicede®/px Data Exchange Format *Preparer's Guide* – Version 11.0 documenting the process used to transfer client exposure and claims data into the model.

Reviewed draft of the CLASIC/2™ User's Guide – Version 11.0 manual documenting the analysis options available for generating modeled losses.

A-6 Logical Relationship to Risk*

*(*Significant Revision due to new Form)*

A. Loss costs shall not exhibit an illogical relation to risk, nor shall loss costs exhibit a significant change when the underlying risk does not change significantly.

B. Loss costs produced by the model shall be positive and non-zero for all valid Florida ZIP Codes.

C. Loss costs cannot increase as the quality of construction type, materials and workmanship increases, all other factors held constant.

D. Loss costs cannot increase as the presence of fixtures or construction techniques designed for hazard mitigation increases, all other factors held constant.

E. Loss costs cannot increase as the quality of building codes and enforcement increases, all other factors held constant.

F. Loss costs shall decrease as deductibles increase, all other factors held constant.

G. The relationship of loss costs for individual coverages, (e.g., structures and appurtenant structures, contents, and loss of use/additional living expense) shall be consistent with the coverages provided.

Audit

1. Graphical representations of loss costs by ZIP Code and county will be reviewed.

2. Color-coded maps depicting the effects of land friction on loss costs by ZIP Code will be reviewed.

3. Individual loss cost relationships will be reviewed. Forms A-1, A-2, A-3, A-4, and A-5 will be used to assess coverage relationships.

Pre-Visit Letter

26. Form A-2, page 153: Discuss results depicted for Levy County and counties in the panhandle region (Franklin and west) with reference to Figure 13 on page 82.

27. Form A-2, page 155: Discuss the change for Monroe County mainland ZIP Code from the previous submission, bright red (>6) last year versus medium blue (1-2) this year. Also, output ranges have minimum $22 per thousand for mobile homes in Monroe County where this ZIP Code is bright red for frame and masonry.

28. Form A-3, page 157: Explain the dashes for the 1916 and 1917 storms. Explain why the Total Dollar Contribution does not agree with the Average Annual Zero Deductible Statewide Loss Costs provided in Form S-5 on page 320. Explain the differences between losses for individual storms such as those in 2004 and 2005 compared to the previous submission.

Verified: YES

Professional Team Comments:

Reviewed results provided in Figures 13-15 (pages 82-84) in comparison to Form A-2 (pages 153-155). Figure 13 uses windspeeds from the historical catalog. Form A-2 contains loss costs calculated from the stochastic catalog.

Discussed the change for Monroe County mainland ZIP Code from the previous submission. Difference attributed to the reduced storm frequency from the HURDAT update. Small change in frequency combined with low exposure results in high sensitivity.

AIR disclosed an error in the generation of Form A-3. Incorrect data was used as the starting point. Reviewed the revised Form A-3. Form further corrected for storm names.

Reviewed revised Form A-2 loss costs maps by ZIP Code. Discussed the process revision to eliminate the error in producing the original maps in Form A-2 from recurring.

A-7 Deductibles and Policy Limits

A. The methods used in the development of mathematical distributions to reflect the effects of deductibles and policy limits shall be actuarially sound.

B. The relationship among the modeled deductible loss costs shall be reasonable.

C. Deductible loss costs shall be calculated in accordance with s. 627.701(5)(a), F.S.

Audit

1. Describe the process used to determine the accuracy of the insurance-to-value criteria in data used to develop or validate the model results.

2. The actuary for the modeler may be asked to attest to the actuarial soundness of the procedure for handling deductibles and policy limits.

3. To the extent that historical data are used to develop mathematical depictions of deductibles and policy limit functions, demonstrate the goodness-of-fit of the data to fitted models.

4. Justify changes from the prior submission in the relativities among corresponding deductible amounts for the same coverage.

Verified: YES

Professional Team Comments:

Verified no change in the process for calculating and applying deductibles and policy limits. Deductible calculations are in compliance with s. 627.701(5)(a), F.S.

A-8 Contents

A. The methods used in the development of contents loss costs shall be actuarially sound.

B. The relationship between the modeled structure and contents loss costs shall be reasonable, based on the relationship between historical structure and contents losses.

Audit

1. The actuary for the modeler may be asked to attest to the actuarial soundness of the procedure for calculating loss costs for contents coverage.

2. To the extent that historical data are used to develop mathematical depictions of contents functions, demonstrate the goodness-of-fit of the data to fitted models.

3. Justify changes from the prior submission in the relativities between loss costs for structures and the corresponding loss costs for contents.

Pre-Visit Letter

29. A-8, Disclosure 1, page 142: Explain how Figure 34 supports the agreement between modeled and actual losses.

Verified: YES

Professional Team Comments:

Reviewed statistical analysis regarding difference in modeled and actual losses for Coverage C.

Reviewed comparisons of modeled and observed losses for contents for different companies.

A-9 Additional Living Expense (ALE)

A. The methods used in the development of ALE loss costs shall be actuarially sound.

B. ALE loss cost derivations shall consider the estimated time required to repair or replace the property.

C. The relationship between the modeled structure and ALE loss costs shall be reasonable, based on the relationship between historical structure and ALE losses.

D. ALE loss costs produced by the model shall appropriately consider ALE claims arising from damage to the infrastructure.

Audit

1. The actuary for the modeler may be asked to attest to the actuarial soundness of the procedure for calculating loss costs for ALE coverage. Documentation and justification of the following will be reviewed:
    a. The method of derivation and data on which the ALE vulnerability function is based;
    b. Validation data specifically applicable to ALE;
    c. Assumptions regarding the coding of ALE losses by insurers;
    d. The effects of demand surge on ALE for Hurricane Andrew (1992);
    e. Assumptions regarding the variability of ALE by size of property;
    f. Statewide application of ALE assumptions;
    g. Assumptions regarding ALE for mobile homes, tenants, and condo unit owners exposure;
    h. The methods used to incorporate the estimated time required to repair or replace the property;
    i. The methodology and available validation for determining the extent of infrastructure damage and its effect on ALE costs.

2. To the extent that historical data are used to develop mathematical depictions of ALE functions, demonstrate the goodness-of-fit of the data to fitted models.

3. Justify the differences in the relationship of structure and ALE loss costs from those previously found acceptable.

Pre-Visit Letter

30. A-9.C, page 144: Explain how Figure 36 supports the agreement between modeled and actual losses.

31. A-9, Disclosure 2, page 145: Explain how Figure 37 supports the agreement between modeled and actual losses.

Verified: YES

Professional Team Comments:

Reviewed results provided in Figures 36 and 37 (pages 144-145). Verified the validation data excludes companies that do not allocate claims to ALE causing apparent anomaly in submission.

Verified no change in the process and calculations used to develop ALE loss costs.

Reviewed comparisons of modeled and observed losses for ALE for different companies.

A-10 Output Ranges

A. Output ranges shall be logical and any deviations supported.

B. All other factors held constant, output ranges produced by the model shall reflect lower loss costs for:

1. masonry construction versus frame construction,

2. residential risk exposure versus mobile home risk exposure,

3. in general, inland counties versus coastal counties, and

4. in general, northern counties versus southern counties.

Audit

1. Forms A-6, A-7, and A-8 will be reviewed.

2. The modeler will be required to justify all changes from the prior submission using the 2007 Florida Hurricane Catastrophe Fund aggregate exposure data.

3. Output ranges will be reviewed to ensure appropriate differentials among deductibles, coverage, and construction types.

4. Anomalies in the output range data will be reviewed and shall be justified.

Pre-Visit Letter

Provide an explanation for each loss cost change of more than 5% from the loss costs produced in the previous submission using the 2007 Florida Hurricane Catastrophe Fund (FHCF) exposure data to the corresponding loss costs produced in the current submission.

32. Form A-6, pages 245, 255, 256, 261, 262: Verify that the shaded cells are sensible relative to the changes in the model from the previous submission.

33. Form A-7, page 273: Explain the probable cause of the output range changes listed below:
    $0 Deductible Frame Coastal
    $0 Deductible Frame North
    $0 Deductible Frame South
    $0 Deductible Masonry North
    Mobile Homes North
    Mobile Homes South

34. Form A-8, pages 274-280: Explain the spatial pattern of change in loss costs from the previous submission. Explain counties of interest, as follows: St. Johns in Figure 56, Bradford in Figures 58 and 59.

Verified: YES

Professional Team Comments:

Discussed the reasonableness of the shaded cells in Form A-6 relative to the changes in the model from the previous year.

Reviewed the output range changes consistent with model changes:

- Update to HURDAT resulting in one new storm in the East/NE region
- Update to HURDAT resulting in removal of one historical storm in Southern Florida
- Catalog changes in the Panhandle and NW Florida due to change in landfall frequency

Reviewed maps by county reflecting the output range changes for:

- $0 deductible coverage A owners frame coastal
- $0 deductible coverage A condo frame north
- $0 deductible coverage C renters frame south
- $0 deductible coverage B owners masonry north
- $0 deductible coverage C mobile home north
- $0 deductible coverage C mobile home south

Discussed the spatial pattern of change in loss costs from the previous year reflected in Figure 56 (page 277) and Figures 58 and 59 (pages 279-280) in the submission.

Reviewed the changes in frame condos loss costs from the previous year for Martin County, Bradford County, Putnam County, Union County, and Clay County.

*****Additional Verification Review Comments*****

Reviewed incorporation of year built in the modeled exposure data and the process change in the application of deductibles and demand surge for Forms A-6, A-7, and A-8.

Discussed the rationale for the shift in percentage changes by county in the revised output ranges for frame, masonry, and mobile home.

Reviewed percentage changes in ALE for mobile homes in Form A-7.

Documentation reviewed:

- Summary of Changes Required to Update Form A-6 Output Ranges, May 8, 2009

A-11 Probable Maximum Loss*

*(*New Standard)*

The methods, data, and assumptions used in the estimation of probable maximum loss levels shall be actuarially sound.

Audit

1. Provide the data and methods used for probable maximum loss levels for Form A-9.

2. All referenced literature will be reviewed to determine applicability.

3. The actuary for the modeler may be asked to attest to the actuarial soundness of the procedures used for calculating probable maximum loss levels.

Pre Visit Letter

Provide and describe all studies performed to determine whether the model meets the "probable maximum loss" requirements added to the standards in the 2008 Report of Activities (Standard A-11 and several other standards and forms).

Verified: YES

Professional Team Comments:

Reviewed and discussed the methodology for producing probable maximum loss estimates.

Reviewed confidence intervals with basis only on the stochastic catalog.

Reviewed track of the top $249 billion event in the stochastic storm set.

Reviewed width of 95% confidence interval in Form A-9.

Reviewed the computer programs for producing probable maximum losses and uncertainty intervals.

STATISTICAL STANDARDS – Mark Johnson, Leader

S-1 Modeled Results and Goodness-of-Fit*

*(*Significant Revision due to new Form and Audit language)*

A. The use of historical data in developing the model shall be supported by rigorous methods published in currently accepted scientific literature.

B. Modeled and historical results shall reflect agreement using currently accepted scientific and statistical methods in the appropriate disciplines.

Audit

1. Forms S-1, S-2, and S-3 will be reviewed. Provide justification for the distributions selected including, for example, citations to published literature or analyses of specific historical data.

2. The modeler's characterization of uncertainty for windspeed, damage estimates, annual loss, and loss costs will be reviewed.

Pre-Visit Letter

35. S-1, Disclosure 1, pages 288-289: Discuss the application of the track model to simulate Florida storms.

36. S-1, Disclosure 3, page 290: Describe any recent wind distribution validations relevant to Florida storms.

Verified: YES

Professional Team Comments:

Reviewed the procedure for storm track generation.

Reviewed recent wind distribution validations relevant to Florida storms.

Reviewed probability distributions for key model variables provided in Form S-3.

Reviewed probability distribution for landfall location for historical and simulated frequencies, 2009 versus 2008 model.

Reviewed plots of simulated versus historical frequencies within 50-mile coastal segments.

Reviewed central pressure distributions for 2008 and 2009 submissions for all Florida segments. Reviewed comparison of corresponding simulated central pressure distributions for selected coastal segments.

Reviewed plot of starting locations for historical storms in the Atlantic basin. Reviewed the methodology for generating the North Atlantic Basin storm catalog.

Reviewed recent wind distribution validations of landfall intensity and location specific wind validations for Hurricanes Kate (1985), Floyd (1987), Andrew (1992), Erin (1995), Opal (1995), Earl (1998), Irene (1999), Charley (2004), Frances (2004), Jeanne (2004), Dennis (2005), Katrina (2005), and Wilma (2005).

Reviewed scatter plots of modeled versus observed windspeed validations. For site specific wind validation, the set was compiled from sites with complete wind records.

Reviewed results of Kolmogorov-Smirnov goodness-of-fit tests for Weibull distribution fitted to central pressure distribution for three different 100-mile segments.

S-2 Sensitivity Analysis for Model Output

The modeler shall have assessed the sensitivity of temporal and spatial outputs with respect to the simultaneous variation of input variables using currently accepted scientific and statistical methods in the appropriate disciplines and have taken appropriate action.

Audit

1. The modeler's sensitivity analysis will be reviewed in detail. Statistical techniques used to perform sensitivity analysis shall be explicitly stated. The results of the sensitivity analysis displayed in graphical format (e.g., contour plots with temporal animation) will be reviewed.

2. Form S-6 will be reviewed for models submitted by modeling organizations which have not previously provided the Commission with this analysis.

Trade Secret Information to be presented to the Professional Team (page 8):

- S-2 – Results of sensitivity studies for hurricane model losses and input variables

Verified: YES

Professional Team Comments:

Reviewed validation of the research version of the windfield model and comparison of validation results to the current windfield model.

Reviewed sensitivity studies involving central pressure and the gradient windspeed reduction factor.

S-3 Uncertainty Analysis for Model Output

The modeler shall have performed an uncertainty analysis on the temporal and spatial outputs of the model using currently accepted scientific and statistical methods in the appropriate disciplines and have taken appropriate action. The analysis shall identify and quantify the extent that input variables impact the uncertainty in model output as the input variables are simultaneously varied.

Audit

1. The modeler's uncertainty analysis will be reviewed in detail. Statistical techniques used to perform uncertainty analysis shall be explicitly stated. The results of the uncertainty analysis displayed in graphical format (e.g., contour plots with temporal animation) will be reviewed.

2. Form S-6 will be reviewed for models submitted by modeling organizations which have not previously provided the Commission with this analysis.

Trade Secret Information to be presented to the Professional Team (page 8):

- S-3 – Results of uncertainty studies for hurricane model losses and input variables

Verified: YES

Professional Team Comments:

Reviewed uncertainty studies associated with warmer sea surface temperatures.

S-4 County Level Aggregation

At the county level of aggregation, the contribution to the error in loss cost estimates attributable to the sampling process shall be negligible.

Audit

1. Provide a graph assessing the accuracy associated with a low impact area such as Nassau County. We would expect that if the contribution error in an area such as Nassau County is small, the error in the other areas would be small as well. Assess where appropriate, the contribution of simulation uncertainty via confidence intervals.

Trade Secret Information to be presented to the Professional Team (page 8):

- S-4 – Graphs assessing the contribution to error in loss costs by county

Verified: YES

Professional Team Comments:

Reviewed constrained sampling method used to obtain convergence and reduce sampling variability on loss costs by county.

Reviewed convergence graphs and comparisons of the loss costs based on various simulation lengths for Nassau County, Palm Beach County, and several other counties.

S-5 Replication of Known Hurricane Losses

The model shall estimate incurred losses in an unbiased manner on a sufficient body of past hurricane events from more than one company, including the most current data available to the modeler. This Standard applies separately to personal residential and, to the extent data are available, to mobile homes. Personal residential experience may be used to replicate structure-only and contents-only losses. The replications shall be produced on an objective body of loss data by county or an appropriate level of geographic detail.

Audit

1. The following information for each insurer and hurricane will be reviewed:
   a. The validity of the model assessed by comparing expected losses produced by the model to actual observed losses incurred by insurers at both the state and county level,
   b. The version of the model used to calculate modeled losses for each hurricane provided,
   c. A general description of the data and its source,
   d. A disclosure of any material mismatch of exposure and loss data problems, or other material consideration,
   e. The date of the exposures used for modeling and the date of the hurricane,
   f. An explanation of differences in the actual and modeled hurricane parameters,
   g. A listing of the departures, if any, in the windfield applied to a particular hurricane for the purpose of validation and the windfield used in the model under consideration,
   h. The type of property used in each hurricane to address:
      1. Personal versus commercial
      2. Residential structures
      3. Mobile homes
      4. Condominiums
      5. Structures only
      6. Contents only,
   i. The inclusion of demand surge, storm surge, loss adjustment expenses, or law and ordinance coverage in the actual losses, or the modeled losses.

2. The following documentation will be reviewed:
   a. Publicly available documentation referenced in the submission,
   b. The data sources excluded from validation and the reasons for excluding the data from review by the Commission (if any),
   c. An analysis that identifies and explains anomalies observed in the validation data,
   d. User input sheets for each insurer and hurricane detailing specific assumptions made with regard to exposed property.

3. The confidence intervals used to gauge the comparison between historical and modeled losses will be reviewed.

4. Form S-4 will be reviewed.

5. The results of one hurricane event for more than one insurance company and the results from one insurance company for more than one hurricane event will be reviewed to the extent data are available.

Verified: YES

Professional Team Comments:

Reviewed validation comparisons provided in Form S-4.

S-6 Comparison of Projected Hurricane Loss Costs

The difference, due to uncertainty, between historical and modeled annual average statewide loss costs shall be reasonable, given the body of data, by established statistical expectations and norms.

Audit

1. Form S-5 will be reviewed.

2. Justify the following:
   a. Meteorological parameters,
   b. The effect of by-passing storms,
   c. The effect of actual hurricanes that had two landfalls impacting Florida,
   d. The departures, if any, from the windfield, vulnerability functions, or insurance functions applied to the actual hurricanes for the purposes of this test and those used in the model under consideration, and
   e. Exposure assumptions.

Verified: YES

Professional Team Comments:

Reviewed Form S-5. Difference with the total loss produced by the model in Form A-3 is due to Form S-5 including additional storms identified by the modeler as affecting Florida and Form A-3 being based only on storms provided in Form A-3.

Reviewed confidence interval calculations and compared them with those for probable maximum loss estimates.

COMPUTER STANDARDS – Paul Fishwick, Leader

Trade Secret Information to be presented to the Professional Team (page 8):

- Computer Standards – All software, documentation, specifications, and procedures as specified in the audit section of each standard

C-1 Documentation*

*(*Significant Revision)*

A. The modeler shall maintain a primary document binder, containing a complete set of documents specifying the model structure, detailed software description, and functionality. Development of each section shall be indicative of accepted software engineering practices.

B. All computer software (i.e., user interface, scientific, engineering, actuarial, data preparation, and validation) relevant to the modeler's submission shall be consistently documented and dated.

C. The modeler shall maintain (1) a table of all changes in the model from the prior year's submission to the initial submission this year and (2) a table of all substantive changes since this year's initial submission.

D. Documentation shall be created separately from the source code.

Audit

1. The primary document binder, in either electronic or physical form, and its maintenance process will be reviewed. The binder shall contain fully documented sections for each Computer Standard.

2. All documentation shall be easily accessible from a central location.

3. Complete user documentation, including all recent updates, will be reviewed.

4. Modeler personnel, or their designated proxies, responsible for each aspect of the software (i.e., user interface, quality assurance, engineering, actuarial, verification) shall be present when the Computer Standards are being audited. Internal users of the software will be interviewed.

5. Provide verification that documentation is created separately from the source code.

6. The tables specified in C-1.C that contain the items listed in Standard G-1, Disclosure 5 will be reviewed. The tables shall contain the item number in the first column. The remaining five columns shall contain specific document or file references for affected components or data relating to the following Computer Standards: C-2, C-3, C-4, C-5, and C-6.

7. Trace the model changes specified in Standard G-1, Disclosure 5 through all Computer Standards.

Information to be presented to the Professional Team:

- C-1.A, page 322 – The primary document binder set (12 binders total), which contains fully documented sections for each computer standard, shall be available for inspection by the Professional Team.
- C-1.B, page 322 – All components as defined by the Requirements are fully documented and such documentation shall be available for review by the Professional Team.
- C-1.D, page 322 – Documentation is provided via in-line detailed comments and external, higher-level documentation that shall be able to be available for review by the Professional Team.

Pre-Visit Letter

37. C-1.C, page 322: Relate the table of contents with the response to Standard G-1, Disclosure 5 on pages 25-26 by demonstrating individual table item compliance with the Computer Standards C-1 through C-7.

Verified: YES

Professional Team Comments:

Discussed with Tyler Maxwell his review of AIR's implementation of the model within the CLASIC/2™ software and compliance with the Computer Standards.

Reviewed Enhancements and Document Mapping binder which includes mapping of the U.S. Hurricane Model version 11.0 itemized changes to the appropriate documents in the Computer Standards.

Reviewed CLASIC/2™ User Guide version 11.0.

Reviewed UNICEDE®/px Data Exchange Format Preparer's Guide version 11.0.

Reviewed the primary document binder containing:

CLASIC/2 Release Notes, version 10.0
CLASIC/2 Release Notes, version 10.5
CLASIC/2 Installation and System Configuration
CLASIC/2 Update Instructions
Getting Started with CLASIC/2
CLASIC/2 Reference Guide
CLASIC/2 User's Guide
Glossary
AIR ImportExpress for CLASIC/2 User's Guide
CLASIC/2 Database Reference Manual
Managing CLASIC/2 Databases with AIRDBAdmin
UNICEDE/px Data Exchange Format Preparer's Guide

UNICEDE/fx Data Exchange Format Preparer's Guide

C-2 Requirements

The modeler shall maintain a complete set of requirements for each software component as well as for each database or data file accessed by a component.

Audit

1. Provide confirmation that a complete set of requirements for each software component, as well as for each database or data file accessed by a component, has been maintained and documented.

Information to be presented to the Professional Team:

- C-2, page 323 – CLASIC/2 documentation specifying model requirements and computer implementation for each software component shall be available for verification by the Professional Team.

Verified: YES

Professional Team Comments:

Reviewed requirements documentation for all changes implemented in version 11.0 including the annual ZIP Code database and historical storm set updates.

Reviewed documentation summarizing the requirements for the software and data files used in the development of the U.S. Hurricane model.

Reviewed the requirements binder containing:

CLASIC/2 Release-Based Enhancements
Model 21 and CLASIC/2 Enhancements and Florida Commission Documentation Mapping
Model 21 Requirements
Catalog Generation Requirements
Physical Properties Requirements
ZIPAll Requirements
HURSIM Requirements
Individual Risk Requirements
Loss Data Requirements
Demand Surge Requirements
CLASIC/2 Requirements Summary
Data Sources and Third Party Applications

C-3 Model Architecture and Component Design

The modeler shall maintain and document (1) detailed control and data flow diagrams and interface specifications for each software component, and (2) schema definitions for each database and data file. Documentation shall be to the level of components that make significant contributions to the model output.

Audit

1. The following will be reviewed:
   a. Detailed control and data flow diagrams, completely and sufficiently labeled for each component,
   b. Interface specifications for all components in the model,
   c. Documentation for schemas for all data files, along with field type definitions,
   d. Each network diagram including components, sub-component diagrams, arcs, and labels.

2. A model component custodian, or designated proxy, shall be available for the review of each component.

Information to be presented to the Professional Team:

- C-3, page 324 – The component design documents include detailed control and data flow diagrams, and class diagrams for all other portions of the U.S. hurricane model and CLASIC/2 system. These documents shall be available to the Professional Team.

Verified: YES

Professional Team Comments:

Reviewed the flowchart prepared on-site to describe the generation of the revised Form A-3.

Reviewed Model Architecture and Component Design binders containing introductory documents for the CLASIC/2 software components and database and reference documentation for understanding the CLASIC/2 database design.

Reviewed Model Architecture and Component Design binder 1 that describes the CLASIC/2 presentation and business layers, which are necessary in understanding the relationship between the engine and the model framework.

Reviewed Model Architecture and Component Design binder 2 that provides a reference to the CLASIC/2 database objects (tables, views, stored procedures) and the underlying relationships between the components of the databases.

Reviewed UNICEDE®/px Data Exchange Format – Preparer's Guide – Version 11.0 for formatting data used as an input to the model.

Reviewed the model architecture and component design binders containing:

Event Generation Flowcharts
CLASIC/2 Overview
CLASIC/2 Presentation Layer
CLASIC/2 Business Layer
CLASIC/2 Common Services Layer
CLASIC/2 Loss Analysis Engine
CLASIC/2 Hazard Model Framework
CLASIC/2 Database Layer
CLASIC/2 AirAreaCode Database Reference Manual
CLASIC/2 AirCL2Exp Database Reference Manual
CLASIC/2 AirCL2Loss Database Reference Manual
CLASIC/2 AirCommon Database Reference Manual
CLASIC/2 AirExpWork Database Reference Manual

*****Additional Verification Review Comments*****

Reviewed schema changes for incorporating year built in the modeled exposure data to generate Form A-6, Output Ranges.

C-4 Implementation

A. The modeler shall maintain a complete procedure of coding guidelines consistent with accepted software engineering practices.

B. The modeler shall maintain a complete procedure used in creating, deriving, or procuring and verifying databases or data files accessed by components.

C. All components shall be traceable, through explicit component identification in the flow diagrams, down to the code level.

D. The modeler shall maintain a table of all software components affecting loss costs, with the following table columns: (1) Component name, (2) Number of lines of code, minus blank and comment lines; and (3) Number of explanatory comment lines.

E. Each component shall be sufficiently and consistently commented so that a software engineer unfamiliar with the code shall be able to comprehend the component logic at a reasonable level of abstraction.

F. The modeler shall maintain the following documentation for all components or data modified by items identified in Standard G-1, Disclosure 5:

1. A list of all equations and formulas used in documentation of the model with definitions of all terms and variables.

2. A cross-referenced list of implementation source code terms and variable names corresponding to items within F.1.

Audit

1. The interfaces and the coupling assumptions will be reviewed.

2. Provide the documented coding guidelines and confirm that these guidelines are uniformly implemented.

3. The procedure used in creating, deriving, or procuring and verifying databases or data files accessed by components will be reviewed.

4. The traceability among components at all levels of representation will be reviewed.

5. The following information shall be available and will be reviewed for each component, either in a header comment block, source control database, or the documentation:
    a. component name,
    b. date created,
    c. dates modified and by whom,
    d. purpose or function of the component, and
    e. input and output parameter definitions.

6. The table of all software components as specified in C-4.D will be reviewed.

7. Model components and the method of mapping to elements in the computer program will be reviewed.

8. Comments within components will be examined for sufficiency, consistency, and explanatory quality.

Pre-Visit Letter

38. C-4.B, page 325: Demonstrate the process for verifying databases as stated in the submission.

Verified: YES

Professional Team Comments:

Reviewed Implementation binders identifying the development stages and process including error code, line count documentation, software coding standards and guidelines.

Reviewed the process for verifying databases accessed by the modeling components.

Reviewed the code for calculating the probable maximum loss to generate Form A-9.

Reviewed the vulnerability module in CLASIC/2, including:
- U.S. Hurricane code
- Excel spreadsheet
- Code that initializes damage functions, calculates mean damage, and uses linear interpolation

Reviewed the implementation binder containing:

Research

AIR Tropical Cyclone Model for the U.S. Gulf and East Coasts

Catalog Generation

Catalog Generation Code

FORTRAN Data Files for Catalog Generation

U.S. Physical Properties

Physical Properties Generation Code

FORTRAN - Data Files for Generating U.S. Physical Properties

ZIPAll
ZIP Centroid Creation Summary and Verification
ZIPAll Creation
Data Files for ZIPAll Creation
HURSIM
HURSIM-Technical Overview
HURSIM - Data Files
Individual Risk
Individual Risk Technical Overview
Data Files for Individual Risk
Loss Data
Loss Data Technical Overview
Data Files for Loss Data
Demand Surge
Demand Surge Validation and Implementation
Data Files for Validation and Calculation of Demand Surge

Model 21
Model 21 Development and Implementation Process
Model 21 Technical Overview
Model 21 Data Files
Model 21 2009 Data Files
Model 21 Flowcharts

Datafile Converter
Using Data File Converter

CLASIC/2
Setting up a CLASIC/2 Developer's Environment
CLASIC/2 Feature Design and Implementation Process
Implementing New Perils and Models in CLASIC/2
Creating Maps in CLASIC/2
Updating the AirCL2Ind Database
Updating the ZIP Codes in the AirAreaCode Database
Building CLASIC/2
CLASIC/2 Registry Settings
Output Range Reports – Guidelines for Preparation
Probable Maximum Loss – Guidelines for Preparation

Formulas/Equations/Variable Mapping
Model 21 Equations/Formulas and Variable Mapping

Error Code Documentation
FORTRAN – Catalog Generation Error Codes
FORTRAN – Physical Properties Error Codes
FORTRAN – ZipAll Creation Error Codes
Model 21 - Error Codes
Datafile Converter Error Codes
CLASIC/2 Engine Errors and Descriptions

Line Counts
FORTRAN Catalog Generation Line Count
FORTRAN - Physical Properties Line Count

FORTRAN - ZIPAll Line Count
Datafile Converter - Line Count
CLASIC/2 Engine and Model 21 Line Counts

Coding Guidelines

FORTRAN Coding Guidelines
C++/COM Coding Guidelines
C#/.Net Coding Guidelines
Java Coding Guidelines
Technical Documentation Guidelines

*****Additional Verification Review Comments*****

Reviewed updated SQL scripts for demand surge and annual deductibles to include year built.

Reviewed SQL coding changes for the generation of Form A-6, Output Ranges.

C-5 Verification

A. General

For each component, the modeler shall maintain procedures for verification, such as code inspections, reviews, calculation crosschecks, and walkthroughs, sufficient to demonstrate code correctness. Verification procedures shall include tests performed by modeler personnel other than the original component developers.

B. Component Testing

1. The modeler shall use testing software to assist in documenting and analyzing all components.

2. Unit tests shall be performed and documented for each component.

3. Regression tests shall be performed and documented on incremental builds.

4. Aggregation tests shall be performed and documented to ensure the correctness of all model components. Sufficient testing shall be performed to ensure that all components have been executed at least once.

C. Data Testing

1. The modeler shall use testing software to assist in documenting and analyzing all databases and data files accessed by components.

2. The modeler shall perform and document integrity, consistency, and correctness checks on all databases and data files accessed by the components.

Audit

1. The components will be reviewed for containment of sufficient logical assertions, exception-handling mechanisms, and flag-triggered output statements to test the correct values for key variables that might be subject to modification.

2. The testing software used by the modeler will be reviewed.

3. The component (unit, regression, aggregation) and data test processes and documentation will be reviewed including compliance with independence of the verification procedures.

Pre-Visit Letter

39. C-5.C, page 331: Discuss the digital signature comparison as part of the Verification Utility program.

Information to be presented to the Professional Team:

- C-5.A, page 330 – Examples of these verification procedures, including code inspections, reviews, calculation crosschecks, walk-through, and the use of logical assertions and exception-handling mechanisms in the code, are described within the documentation and shall be available to the Professional Team.
- C-5.B, page 331 – Materials that demonstrate SQA processes shall be available to the Professional Team for review during their site visit.

Verified: YES

Professional Team Comments:

Reviewed verification methods associated with the June 2008 HURDAT storm set update.

Reviewed verification methods associated with the ZIP Code database update.

Discussed the digital signature comparison as part of the Verification Utility program.

Reviewed the Project Information Assumption Form (PIAF) associated with verifying insurer input data.

Reviewed database verification method using checksums.

Verified the cross-verification of code associated with computing probable maximum loss via independent code development.

Reviewed the verification and testing that occurs during the implementation stages documentation. Documents correlate to the testing that occurs during each stage in the implementation process, the verification of the catalog generation and physical properties data in the research stage, an organizational breakdown of the product test suite, and the CLASIC/2 output using specifications provided by the Commission.

Reviewed the verification binder containing:

Research

Catalog Generation Code Testing
Physical Properties Generation Code Testing
Individual Risk Testing
Loss Data Testing

Model 21

Model 21 – Testing for CLASIC/2
Unit Testing of Model 21 in CLASIC/2
Model 21 Basic and Final QA Test Cases

Datafile Converter

Datafile Converter - Testing

CLASIC/2

CLASIC/2 QA Test Tools
CLASIC/2 Code Verification
CLASIC/2 Functional Test Plan
CLASIC/2 Test Classifications
Analysis Classification Tests
Book List Testing
CLASIC/2 Claims Count Test Plan
Demand Surge Test Plan
Demand Surge Test Plan
Demand Surge Test Plan, v10.0
Deterministic Terrorist Test Plan
Event Filter Analysis
Filter/Move/Delete Policy Test Plan
MAOL
Marginal Impact Testing
Meta Filter Testing
Numbers Testing
Save Area Testing
Storm Surge Test Plan
Submit Status and As Of Date Testing
CLASIC/2 Uncertainty Defaults
Workers' Compensation Default
Save by LOB and Contract Summary
Consolidate Classification Tests
New Specifications_IR_1 Test Plan
User Selectable Storm Surge
Exposure Classification Tests
Address Server Stress Testing
Area Code Testing
Control Total Import Express
Control Total UNICEDE
CRESTA Testing
Geocode Service Test Plan
CLASIC/2 UNICEDE Import Test Plan
AIR ImportExpress Import Options Test Cases
ASF Testing
Non-Geocoded Risks Testing
Spreadsheet Import
UNICEDE/1 Test Plan
World Wide Data Storage Test Plan
Installation Classification Tests
Test Cases for Licensing

Installation Test Plan
DBAdmin Test Cases
Historical Event Set Installation Test Plan
Installation Test Grid
User Access Administration and Login Test Plan

Job Manager Classification Tests

Job Manager Geocode Test Plan

Output Classification Tests

CLF Numbers Test Plan
Exports Test Plan
Reports Testing
Save Results Options
CLASIC/2 Historical CLF Test Plan
50K CLF Test Plan

Performance Classification Tests

Engine Test
Geocode Test Plan
Air ImportExpress Performance Tests
Model Smoke and Performance Test Plan
UNICEDE/px Import Performance Test Plan
Financial Module Test Plan

UI/Functionality Classification Tests

Copy Book Test Plan
Currency Testing
Event Set Manager Test Plan
Global Test Plan
Non-AIR Construction/Occupancy Tests
Treaty Perspective on the UI

Loss Results

Form A-1: Loss Costs
Form A-2: Zero Deductible Loss Costs by ZIP Code
From A-3: Base Hurricane Storm Set Statewide Loss Costs
Form A-4: Hurricane Andrew (1992) Percent of Losses
Form A-5: Cumulative Losses from the 2004 Hurricane Season
Form A-6: Output Ranges
Form A-7: Percentage Change in Output Ranges
Form A-8: Percentage Change in Output Ranges by County
Form A-9: Probable Maximum Loss for Florida

C-6 Model Maintenance and Revision*

*(*Significant Revision)*

A. The modeler shall maintain a clearly written policy for model revision, including verification and validation of revised components, databases, and data files.

B. A revision to any portion of the model that results in a change in any Florida residential hurricane loss cost shall result in a new model version number.

C. The modeler shall use tracking software to identify all errors, as well as modifications to code, data, and documentation.

D. The modeler shall maintain a list of all model versions since the initial submission for this year. Each model description shall have a unique version identification, and a list of additions, deletions, and changes that define that version.

Audit

1. All policies and procedures used to maintain the code, data, and documentation will be reviewed. For each component in the system decomposition, the modeler shall provide the installation date under configuration control, the current version number, and the date of the most recent change(s).

2. The policy for model revision will be reviewed.

3. The tracking software will be reviewed.

4. The list of all model revisions as specified in C-6.D will be reviewed.

Information to be presented to the Professional Team:

- C-6.D, page 333 – The Model 21 and CLASIC/2 Version Change History document identifies all component changes for the U.S. hurricane model and CLASIC/2 application, including the additions, deletions, and updates for all version starting with Version 10.0. This document shall be available for review by the Professional Team.
- C-6.1, page 333 – We are prepared to demonstrate these systems and methodologies during the Professional Team's site visit.

Pre-Visit Letter

40. C-6.D, page 333: Provide the model version history leading up to the version identified in the submission.

Verified: YES

Professional Team Comments:

Reviewed the Model Maintenance and Revision binder documenting the control and management of the U.S. Hurricane Model and CLASIC/2.

Reviewed the data file revisions policy and the workflow for managing the versioning process.

Reviewed the model version history leading to the current version 11.0.

Reviewed the model maintenance and revision binder containing:

AIR Documentation Control Process
Model and Software Change Control Process
Model and Software Revisions and Versioning
Model 21 and CLASIC/2 Version Change History
AIR Data Control Workbook

C-7 Security

The modeler shall have implemented and fully documented security procedures for: (1) secure access to individual computers where the software components or data can be created or modified, (2) secure operation of the model by clients, if relevant, to ensure that the correct software operation cannot be compromised, (3) anti-virus software installation for all machines where all components and data are being accessed, and (4) secure access to documentation, software, and data in the event of a catastrophe.

Audit

1. The written policy for all procedures and methods used to ensure the security of code, data, and documentation will be reviewed. Specify all security procedures.

2. Documented security procedures for access, client model use, anti-virus software installation, and off-site procedures in the event of a catastrophe will be reviewed.

Verified: YES

Professional Team Comments:

Reviewed the software security and backup procedures policy.

Verified the use of a revised approach to enhance security for client-server connections.

Reviewed the security binder containing:
AIR Code, Data and Documentation Security Policy