



February 25, 2002

Dr. Sneh Gulati  
Chair, Florida Commission on Hurricane  
Loss Projection Methodology  
1801 Hermitage Boulevard, Suite 100  
Tallahassee, FL 32308

Re: ARA Model Submission to November 1, 2001 Standards

Dear Ms. Gulati.

Applied Research Associates, Inc., is pleased to submit our hurricane loss projection model for review by the Florida Commission on Hurricane Loss Projection Methodology. The model has been reviewed by professionals having credentials and/or experience in the areas of meteorology, statistics, actuarial science, engineering, and computer science. The model is ready for review by the professional team.

Attached to this letter is a summary statement of compliance with each individual standard, and a list presenting changes in our responses to the modules. The list of changes does not include minor editorial changes.

Enclosed are 1 unbound and 25 bound copies of our submission, along with 25 Compact Discs containing the submission and the forms.

ARA is prepared to review proprietary data, model documentation, model validation, and any additional questions by the professional team during their visit.

If you have any additional questions regarding this submission, please contact Dr. Peter Vickery.

Sincerely,

A handwritten signature in black ink, appearing to read "Lawrence A. Twisdale, Jr.", written in a cursive style.

Lawrence A. Twisdale, Jr., Ph.D., P.E.  
Principal

LAT/krs

## Attachment 1: ARA Model Submission Checklist

1. Please indicate by checking below that the following has been included in your submission to the Florida Commission on Hurricane Loss Projection Methodology.

Yes	No	Item
x		1. Letter to the Commission
x		a. states that professionals having credentials and/or experience in the areas of meteorology, statistics, actuarial science, engineering, and computer science have reviewed the model for compliance with the standards
x		b. states that model is ready to be reviewed by the Professional Team
x		c. any exceptions to the statements above noted with a complete explanation
x		d. identifies any changes made to Modules 1, 2, and 3 from the previous year's submission, if applicable
x		2. Summary statement of compliance with each individual standard
x		3. General description of information to be presented to the Professional Team and to the Commission
x		4. Data and analyses required by Module 1
x		5. Data and analyses required by Module 2
x		6. Data and analyses required by Module 3
	x	7. Copy of non-proprietary information and documentation the modeler anticipates presenting to the Commission in connection with the Acceptability Process
x		8. General description of any proprietary information the modeler intends to present to the Professional Team in connection with the Acceptability Process
x		9. Model Identification
x		10. Form A
x		11. Form B
x		a. Excel format
x		b. PDF format
x		12. Form C
x		13. Form D
x		a. Excel format
x		b. PDF format
x		14. Form E
x		15. Form F
x		a. Excel format
x		b. PDF format
x		16. Output Ranges
x		a. Excel format
x		b. PDF format
x		c. hard copy included in submission after Form F
x		17. 25 Bound Copies
x		18. 25 CD ROMs
x		a. complete submission in PDF format
x		b. data file names include abbreviated name of Modeler and Standards year
x		19. Table of Contents
x		20. Materials consecutively numbered from beginning to end
x		21. All tables, graphs, and other non-text items clearly labeled
x		22. All tables, graphs, and other non-text items specifically listed in Table of Contents
x		23. Standards and module item numbers in <i>italics</i> , responses in non-italics

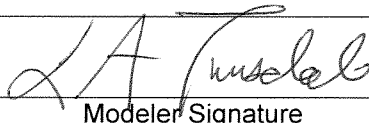
2. Explanation of "No" responses indicated above. (Attach additional pages if needed.)

Materials for Item 7 will be dependent upon requirements of the Professional Team at time of site audit, but will most likely be similar to last year.

Please refer to Attachments 2-4 for Items 1d, 2,3, and 8.

HURLOSS 3.0

Model Name

  
Modeler Signature

Feb-25-2002

Date

## **Attachment 2: ARA Checklist Item 1d.**

### **List of Changes in Answers to Questions in Modules between the 2000 and 2001 Standards**

#### **Module I**

I. General Description of the Model

- I.A. General No changes
- I.B. Loss Costs No changes
- I.C. Other Considerations No changes

II. Specific Description of the Model

- II.A. Model Variables No changes
- II.B. Methodology No changes
- II.C. Validation Test Changes as follows:

- 2. Revised figures showing modeled and observed hurricane characteristics and revised figures showing modeled and observed losses.

#### **Module II**

1. Company Background Changes as follows:

- A. Updated general company information.
- F. Updated income mix.

2. Professional Credentials Changes as follows:

- A. Added new staff member and updated resumes.

3. Multi-discipline Team No changes

4. List of Clients No changes

5. Independent Expert Review No changes

#### **Module III**

- Section I Changes as follows:

7. Graphical comparisons of model degradation rates with Kaplan-DeMaria.
8. Hurricane data set updated through 2000
10. Windspeed maps revised to present one minute sustained values.
11. Updates to landfalling hurricane tables.
12. Updates to landfalling hurricane tables.
13. Update to probability of hurricanes per year table.
14. Updates to distribution of hurricanes by size.

Section II No changes

Section II No changes

Section IV Changes as follows:

9. Updates to all Five validation comparisons.
10. Inclusion of example disclosure form.

Section V Changes as follows:

3. New thematic maps showing ground-up loss costs by zip-code
4. New output range results
5. New description of changes to model producing changes to output ranges.
6. Presentation of monetary contribution to zero deductible AAL from historical storms. Presentation of relative contribution of hurricane Andrew to zip code loss costs for each affected zip code.

Section VI No changes

Tests Changes as follows:

All forms updated (Form A through Form F).

**Attachment 3: ARA Summary Statement of Compliance (Checklist Item 2)**

Standard	Standard Met?
<b>5.1 General Standards</b>	
5.1.1 Scope of the Computer Model and Its Implementation	Yes
5.1.2 Qualifications of Modeler Personnel and/or Independent Experts	Yes
5.1.3 Modeler's Policy of Model Revision	Yes
5.1.4 Independence of Model Components	Yes
5.1.5 Risk Location	Yes
5.1.6 Identification of Units of Measure of the Model	Yes
5.1.7 Visual Presentation of Data	Yes
<b>5.2 Meteorological Standards</b>	
5.2.1 Units of Measure for Model Output	Yes
5.2.2 Damage Function Wind Inputs	Yes
5.2.3 Official Hurricane Set or Suitable Approved Alternatives	Yes
5.2.4 Hurricane Characteristics	Yes
5.2.5 Landfall Intensity	Yes
5.2.6 Hurricane Probabilities	Yes
5.2.7 Hurricane Probability Distributions	Yes
5.2.8 Land Friction	Yes
5.2.9 Hurricane Overland Weakening Rate	Yes
<b>5.3 Vulnerability Standards</b>	
5.3.1 Derivation of Vulnerability Functions	Yes
5.3.2 Required Vulnerability Functions	Yes
5.3.3 Wind Speeds Causing Damage	Yes
5.3.4 Construction Characteristics	Yes
5.3.5 Modification Factors	Yes
5.3.6 Additional Living Expenses	Yes
5.3.7 Mitigation Measures	Yes
<b>5.4 Actuarial Standards</b>	
5.4.1 Underwriting Assumptions	Yes
5.4.2 Actuarial Modifications	Yes
5.4.3 Loss Cost Projections	Yes
5.4.4 Insurer Inputs	Yes
5.4.5 Demand Surge	Yes
5.4.6 Loss Costs Meaning of "Damage"	Yes
5.4.7 Logical Relation to Risk	Yes
5.4.8 Deductibles and Policy Limits	Yes
5.4.9 Contents	Yes
5.4.10 Additional Living Expenses (ALE)	Yes
5.4.11 Building Codes	Yes
5.4.12 Hazard Mitigation	Yes
5.4.13 Replication of Known Hurricane Losses	Yes
5.4.14 Comparison of Estimated Hurricane Loss Costs	Yes
5.4.15 Output Ranges	Yes
5.4.16 County Level Aggregation	Yes
5.4.17 Total Estimated Losses	Yes
<b>5.5 Computer Standards</b>	
5.5.1 Primary Document Binder	Yes
5.5.2 Requirements	Yes
5.5.3 Software Architecture and Component Design	Yes
5.5.4 Implementation	Yes
5.5.5 Software Verification	Yes

5.5.6	Testing	Yes
5.5.7	Software Maintenance and Revision	Yes
5.5.8	User Documentation	Yes
<b>5.6 Statistical Standards</b>		
5.6.1	Use of Historical Data	Yes
5.6.2	Comparison of Historical and Modeled Results	Yes
5.6.3	Characterizing Uncertainty	Yes
5.6.4	Sensitivity Analysis	Yes
5.6.5	Uncertainty Analysis for Model Output	Yes

#### **Attachment 4: ARA Checklist Items 3 and 8**

##### **Item 3. General description of information to be presented to the Professional Team and to the Commission.**

The Professional Team will be shown all documentation binders, validation studies and supporting information for changes in building stock. Material to be presented to the commission will be similar to that presented last year, subject to any changes suggested by the professional team during the on site visit.

##### **Item 8. General description of any proprietary information the modeler intends to present to the Professional Team in connection with the Acceptability Process.**

The Professional Team will be shown all documentation binders, validation studies and supporting information for changes in building stock. Any other materials will be dependent upon requests or suggestions from the Professional Team.