

# **AWIPS Migration**

## **IV&V Test Plan for Task Order 10**

**National Weather Service  
Office of Science and Technology  
Systems Engineering Center**

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# AE TO-10 IV&V Test Plan

## Revision History

Rev. No.	Date	By	Description of Changes
0.1	2/20/09	Jim Calkins	Initial Draft
1.0	2/27/09	Jim Calkins	First Release

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# AE TO-10 IV&V Test Plan

## 1 General Information

### 1.1 Purpose:

This document describes the test objects, the test objectives, the test strategy, the test types, the test resources, and the tools and automation of the test process for the **AWIPS Migration** project.

### 1.2 Scope

This document establishes the Software Test Plan (STP) for Task Order 10 (TO-10) deliverable of the AWIPS Development Environment (ADE) for the Advanced Weather Information Processing System (AWIPS).

### 1.3 System Overview

The Verification and Validation (V&V) is considered to be a life cycle process based on the principle that detecting problems early in the project will cost less than if they are detected later. Early detection allows more time for correction and allows more degrees of freedom for corrective actions.

For TO-10, the AWIPS ADE extends the ADE capabilities delivered under TO-9 AWIPS Continuous Technology Refresh (CTR) Re-Architecture initiative. The capabilities of ADE x.x provide the services support required for end-user applications.

This document describes the IV&V methodologies that are used to verify the above capabilities. It shall be used to assess that the coding is of sufficient quality, contains sufficient internal documentation, responds correctly to commands provided by the user, carries out the mathematical calculations to the required accuracy, and meets the performance requirements when applicable.

## 2 Reference Documents

- *AWIPS Software Product Improvement Plan*
- *Task-order 10 proposal by Raytheon*
- *Internal Software Test Plan by Raytheon*

## 3 Acronyms and Abbreviations

The following list of the acronyms and abbreviations are used in this document:

Acronym	Definition
ADE	AWIPS Development Environment
AWIPS	Advanced Weather Interactive Processing System
CAPE	Convective Available Potential Energy
CAVE	Common AWIPS Visualization Environment
CCB	Configuration Control Board
CIN	Convective Inhibition
CM	Configuration Management
CTR	Continuous Technology Refresh

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Acronym	Definition
DR	Discrepancy Reports
EDEX	Enterprise Data Exchange
FTD	Functional Test Driver
FTP	File Transfer Protocol
GRIB	GRIdded Binary
GSD	Global Systems Division
I&T	Integration and Test
IV&V	Independent Verification and Validation
MDL	Meteorological Development Laboratory
METAR	Meteorological Aviation Routine Weather Report
N-AWIPS	National Centers AWIPS
NCEP	National Centers for Environmental Prediction
NSHARP	National Centers Sounding Hodograph Analysis Research Program
NWS	National Weather Service
OHD	Office of Hydrologic Development
OPS	Office of Operational Systems/AWIPS Support Branch W/OPS21
OST	Office of Science and Technology
RTM	Requirements Traceability Matrix
SEC	Systems Engineering Center
SHEF	Standard Hydro meteorological Exchange Format
STD	Software Test-Case Document
STP	Software Test Plan
TO	Task Order
TP	Test Procedure
V&V	Verification and Validation
WFO	Weather Forecast Office

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### 4 Test Objects

The team will perform the following NWS defined tests in addition to selected planned tests performed at the Raytheon Omaha test facility. This is intended for verifying tests carried out by Raytheon. The IV&V Team will perform the Raytheon Delivery Test test cases provided on both the TO9 and TO10 DVDs (minus the TO9 DT test cases that were updated in TO10).

#### 4.1 Raytheon test cases

##### 4.1.1 TO9 Regression Test Cases

TO9 Test Cases from Raytheon are being run again in TO10 in order to determine if anything was broken during the upgrade and to determine if any failed test cases/steps now pass in TO10. This list is from the AWIPS Migration Task Order 9 (TO9) Delivery Test Report. Test cases that were updated by Raytheon and included on the TO10 DVD have been removed from the TO9 list. Test cases have also been removed from this TO9 list if a more thorough version exists in the NWS test case list.

Raytheon reported the following TTRs were fixed in TO9, also to be tested by IV&V. Note that TTRs that failed in TO9 and were deemed "fixed" by Raytheon in TO10 are included in the TO10 list later in this document.:

20, 22, 23, 27, 28, 30, 36, 37, 43, 46, 52, 59, 96, 100, 102, 114, 117, 136, 153, 158, 160, 161, 175

Test Name	TO9 DVD Filename(s)	Test location(s) (GSD, MDL, NCEP, OHD, SEC)
AvnFPS Cig/Vis Distribution	AvnFPS_CeilingVisDist_AWIPS_II.pdf	MDL
AvnFPS Cig/Vis Trend	AvnFPS_CeilingVisTrend_AWIPS_II.pdf	MDL
AvnFPS initial Configuration	AvnFPS_InitialConfig_AWIPS_II.pdf	MDL
AvnFPS METAR and MOS Decoders	AvnFPS_METAR_and_MOS_Decoders_AWIPS_II.pdf	MDL
AvnFPS METARs	AvnFPS_METARs_AWIPS_II.pdf	MDL
AvnFPS View Current TAF	AvnFPS_ViewCurrentTAF_AWIPS_II.pdf	MDL
AvnFPS Weather Plot	AvnFPS_WeatherPlot_AWIPS_II.pdf	MDL
AvnFPS Wind Rose	AvnFPS_WindRose_AWIPS_II.pdf	MDL
Basic GHG Monitor	Basic_GHG_Monitor__gh001-gh009__TO9_DT_with_Req.pdf	GSD
GFE Layout	Layout_la_1-6_PDT_AWIPS_II.pdf	GSD
GFE Publish	Publish_pu_1-3_PDT_AWIPS_II.pdf	GSD
Performance	Performance_2.0.pdf	SEC
WFO Generated Products	WFO_Generated_Products_TO9_DT_with_Req.pdf	MDL

Table 4-1 Raytheon TO9 Test Cases

##### 4.1.2 TO10 Regression Test Cases

The Raytheon test cases for TO10 are mainly focused around TO-10 capabilities. This list is from the document "Disposition19Dec08-TO10 retest 013109.xls"

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Test Name	TO10 DVD Filename(s)	Test location (s) (GSD, MDL, NCEP, OHD, OPS, SEC)
AvnFPS 30-hour TAF	TO10-0001_AvnFPSTAF_2.0_Ver4_6Feb09_v1.pdf	MDL
HydroGen	TO10-0002_HydroGen_Ver4_6Feb09_v1.pdf	OHD
GFE Text Products	TO10-0003_Text Products(ac010)_2.0_Ver4_6Feb09_v1.pdf	GSD
D2D Derived Parameters	TO10-0004_Derived_Params-Gridded_3.0_Ver2_6Feb09_v1.pdf	GSD
WarnGen	TO10-0005_WarnGen_3.0_Ver2_6Feb09_v1.pdf	OPS
GFE Hazard Grids	TO10-0006_Hazards_Grids_Ver3_6Feb09_v1.pdf	GSD
Text Workstation Display & Edit	TO10-0007_Text_Display_Edit_2.0_Ver3_6Feb09_v1.pdf	GSD?
Hydroview	TO10-0008_Hydroview_Ver3_6Feb09_v1.pdf	OHD
HydroBase	TO10-0009_Hydrobase_Ver2_6Feb09_v1.pdf	OHD
SSHP	TO10-0010_Site_Specific_Ver3_6Feb09_v1.pdf	OHD
RiverMonitor	TO10-0011_RiverMonitor_Ver3_6Feb09_v1.pdf	OHD
Timeseries GUI	TO10-0012_Timeseries_Ver2_6Feb09_v1.pdf	OHD
RiverPro	TO10-0013_RiverPro_Ver3_6Feb09_v1.pdf	OHD
MPE	TO10-0014_MPE_Ver3_6Feb09_v1.pdf	OHD
Skew-T	TO10-0015_Skew_T_2.0_Ver2_6Feb09_v1.pdf	?
Guardian	TO10-0016_Guardian_Ver3_6Feb09_v1.pdf	?
Radar Graphic & Text Products	TO10-0017_Radar_Graphs_and_Txt_Prods_Ver2_6Feb09_v1.pdf	GSD?
µEngine CLI	TO10-0018_uEngine_Comm_Line_Interface_Ver3_6Feb09_v1.pdf	SEC
TextDB CLI	TO10-0019_TextDB_Comm_Line_Interface_Ver3_6Feb09_v1.pdf	SEC
Subscriptions (formerly Triggers)	TO10-0021_Subscription_Capability_Ver3_6Feb09_v1.pdf	SEC
Hydro Token Field Management	TO10-0022_Hydro_Config_Ver4_6Feb09_v1.pdf	OHD
SOA Plugins	TO10-0023_SOA_Plug_Ins_3.0_Ver2_6Feb09_v1.pdf	SEC?
Stability	TO10-0024_Stability_3.0_v1.pdf	SEC
Rate of Change Checker	TO10-0025_Rate_of_Change_Ver3_6Feb09_v1.pdf	OHD
Volume Browser	TO10-0026_VolumeBrowser_2.0_Ver3_6Feb09_v1.pdf	GSD
GFE Smart Tools & Procedures	TO10-0027_Smart Tools_Procs(ac009)_2.0_Ver3_6Feb09_v1.pdf	GSD

Table 4-2 Raytheon TO10 Test Cases

### 4.1.3 TTRs Fixed in TO10

Raytheon reported that 99 TTRs were fixed in TO10. Those TTRs are listed below, and are shown in full detail in the document "TTRs to retest in TO10.pdf"

2, 3, 4, 7, 8, 10, 11, 15, 16, 17, 31, 33, 34, 39, 44, 45, 47, 48, 61, 63, 67, 68, 69, 76, 77, 86, 87, 88, 101, 105, 106, 107, 108, 109, 110, 111, 113, 116, 139, 156, 170, 177, 180, 187, 198, 199, 201, 202, 203, 265,

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284, 288, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 314, 335, 340, 344, 377, 385, 386, 388, 391, 395, 397, 398, 404, 428, 434, 436, 438, 439, 440, 441, 443, 453, 454, 455, 456, 457, 462, 463, 464

### 4.2 NWS Test Cases

Test	Test Name	Test Location(s)
TO09_0001	AC - GFESuite Acceptance	GSD
TO09_0002	AI - Aids (Topography/Maps/Samples)	GSD
TO09_0003	CG - GFE Configuration	GSD
TO09_0004	CS - ifpServer Configuration	GSD
TO09_0005	EA - Edit Areas	GSD
TO09_0006	EP - Edit Preferences	GSD
TO09_0007	FN - Frame Behavior	GSD
TO09_0008	GM - Grid Manager / Time Editing	GSD
TO09_0009	IN - Initialization	GSD
TO09_0010	IP - Interpolation	GSD
TO09_0011	PO - Populate	GSD
TO09_0012	SE - Spatial Editor Legends/Popups	GSD
TO09_0013	SC - Spatial Editor - Contour/Pencil Tools	GSD
TO09_0014	ST - Spatial Editor - Edit Area Based Tools	GSD
TO09_0015	SM - Smart Tools	GSD
TO09_0016	TE - Temporal Editor	GSD
TO09_0017	Functional Tests	GSD
TO09_0018	Data Integrity	GSD
TO09_0019	Derived Parameters	GSD
TO09_0020	BUFR & Redbooks	GSD
TO09_0021	Software Installation	GSD
TO09_0022	Replicate Raytheon Test Results	GSD
TO09_0023	Performance	GSD
TO09_0024	Purger	GSD
TO09_0025	Adding a Localization Site	GSD
TO10_0021		GSD
TO10_0022		GSD
TO10_0023		GSD
TO10_0024		GSD
TO10_0025		GSD
TO10_0026		GSD
TO10_2001	Time of Arrival/Lead Time Test	MDL
TO10_2002	Plot Model Regression Testing	MDL
TO10_2003	Time of Arrival/Lead Time Product Button map	MDL
TO10_2004	AVNFPS Button map	MDL
TO10_4201	Global Grid Ingest, Decode and Display Test	NCEP

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Test	Test Name	Test Location(s)
TO10_4202	NDFD Ingest, Decode and Display Tests	NCEP
TO10_4203	Ingest, Decode and Display Grids with Bitmaps/Missing Data	NCEP
TO10_4301	METAR Decode and Display Test Cases	NCEP
TO10_4302	TAF Decode and Display Test Cases	NCEP
TO10_4303	PIREP Decode and Display Test Cases	NCEP
TO10_4304	AIREP Decode and Display Test Cases	NCEP
TO10_4305	BINLIGHTLING Decode and Display Test Cases	NCEP
TO10_4306	BUFRUA Decode and Display Test Cases	NCEP
TO10_4307	GRIB Decode and Display Test Cases	NCEP
TO10_4308	MODELSOUNDING Decode and Display Test Cases	NCEP
TO10_4309	PROFILER Decode and Display Test Cases	NCEP
TO10_4310	RADAR Decode and Display Test Cases	NCEP
TO10_4311	RECCO Decode and Display Test Cases	NCEP
TO10_4312	REDBOOK Decode and Display Test Cases	NCEP
TO10_4313	SATELLITE Decode and Display Test Cases	NCEP
TO10_4314	SFCOBS Decode and Display Test Cases	NCEP
TO10_4315	SHEF Decode and Display Test Cases	NCEP
TO10_4316	WARNING Decode and Display Test Cases	NCEP
TO10_4317	CCFP Decode and Display Test Cases	NCEP
TO10_5101	SHEF Decoder Parse and Post to the IHFS Database	OHD
TO10_5201	Hydrologic Time Series Viewer	OHD
TO10_5202	HydroBase	OHD
TO10_5203	HydroView	OHD
TO10_5204	SiteSpecific Hydrologic Predictor	OHD
TO10_5205	RiverMonitor	OHD
TO10_5206	Rate of Change Checker	OHD
TO10_5207	PDC	OHD
TO10_5208	Logistical Measures/Forecast Services	OHD
TO10_8001	Text, Satellite, GRIB, & Radar Throughput & Latency Test Case	SEC
TO10_8002	Text Latency with Large Binary Volume Performance Test Case	SEC
TO10_8004	CAVE Feature Test Cases	SEC
TO10_8005	Product Storage Stress & Performance Test Case	SEC
TO10_8006	CAVE & Graphics Card Memory Stress Test Case	SEC
	TO10 Fixed TTRs (IV&V Test Case)	GSD, MDL, SEC
TO10_8011		
TO10_9001	Active warnings during life cycle	OPS
TO10_9002	Proper WarnGen format	OPS

Table 4-3 NWS Test Cases

### 4.2.1 GSD Test Cases [Test Case 0000 Series]

Assumptions:

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- Any performance testing of TO10 will be conducted on our AWIPS MIGRATION development and test system, a2dp, using live data.
- Other (function-only) tests may be run on other suitable workstations, using sample data or a2dp's live data.

### 4.2.1.1 GFE Test Cases

During GFE development, GSD created a large set of manual and automated test cases. The last update was in May 2006 for OB7.2, but the cases are still applicable to current releases. For TO10, it is appropriate to exercise the manual tests. The suite comprises 571 tests in 29 categories. Some of the test cases may not be supported, but we include them here for completeness and convenience. Each 'test case' below represents one of the 16 categories to be tested. The individual cases are available at the indicated Web site.

#### [TO10\\_0001](#): AC - GFESuite Acceptance (10 cases)

- Test Objective: Verify the basic setup and functions of GFE
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

#### [TO10\\_0002](#): AI - Aids (Topography/Maps/Samples) (25 cases)

- Test Objective: Exercise maps, sample sets, climatology, and logging.
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

#### [TO10\\_0003](#): CG - GFE Configuration (114 cases)

- Test Objective: Verify and exercise GFE configuration settings.
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

#### [TO10\\_0004](#): CS - ifpServer Configuration (25 cases)

- Test Objective: Test local settings for ifpServer.
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

#### [TO10\\_0005](#): EA - Edit Areas (45 cases)

- Test Objective: Create and manipulate Edit Areas.
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

#### [TO10\\_0006](#): EP - Edit Preferences (9 cases)

- Test Objective: Test application of editing preferences.
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

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### TO10\_0007: FN - Frame Behavior (4 cases)

- Test Objective: Exercise frame stepping functions.
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

### TO10\_0008: GM - Grid Manager / Time Editing (23 cases)

- Test Objective: Create and manipulate grid objects.
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

### TO10\_0009: IN - Initialization (14 cases)

- Test Objective: Create weather elements from external data.
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

### TO10\_0010: IP - Interpolation (5 cases)

- Test Objective: Examine interpolation behavior.
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

### TO10\_0011: PO - Populate (8 cases)

- Test Objective: Load weather elements and use the Weather Element Browser
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

### TO10\_0012: SE - Spatial Editor Legends/Popups (29 cases)

- Test Objective: Test Spatial Editor legends and pop-ups.
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

### TO10\_0013: SC - Spatial Editor - Contour/Pencil Tools (11 cases)

- Test Objective: Exercise Contour and Pencil tools.
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

### TO10\_0014: ST - Spatial Editor - Edit Area Based Tools (6 cases)

- Test Objective: Test tools that apply to Edit Areas.
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing

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- Qualification/Verification Method: Demonstration

### TO10\_0015: SM - Smart Tools (23 cases)

- Test Objective: Create and exercise Smart Tools
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

### TO10\_0016: TE - Temporal Editor (10 cases)

- Test Objective: Verify functions of Temporal Editor.
- Type of information to be recorded: test procedure checklists
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

#### 4.2.1.2 D2D Test Cases

### TO10\_0017: Functional Tests

- Test Objective: Once we see exactly what is in the build, conduct additional tests that will utilize the system based on our knowledge of operational use.
- Type of information to be recorded: TBD
- Test Level: Subsystem
- Test Type/Class: Functional Testing
- Qualification/Verification Method: Demonstration

### TO10\_0018: Data Integrity

- Test Objective: Determine data integrity
- Type of information to be recorded: visual comparison, data sampling, listings of text-based data, others TBD
- Test Level: Subsystem
- Test Type/Class: Data Acquisition & Functional Testing
- Qualification/Verification Method: Inspection, Analysis

### TO10\_0019: Derived Parameters

- Test Objective: Exercise derived parameter functions
- Type of information to be recorded: tester feedback
- Test Level: Subsystem
- Test Type/Class: Human Factors & Functional Testing
- Qualification/Verification Method: Demonstration

### TO10\_0020: BUFR & Redbooks

- Test Objective: Review BUFR and Redbook datasets
- Type of information to be recorded: decoder log entries, visual inspection of menus and products
- Test Level: Subsystem
- Test Type/Class: Data Acquisition & Functional Testing
- Qualification/Verification Method: Inspection, Analysis

#### 4.2.2 MDL Test Cases [Test Case 2000 Series]

### TO10\_2001 - Time of Arrival/Lead Time Test

- Test Objective: To verify TO10 functionality of the "Time of Arrival/Lead Time" tool in CAVE, the TO8-2001 procedures will be repeated. The tester will be required to:
  - Load the application.

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- Use the application to track a feature over time, using each of the three display modes (point, polyline, circular front).
- Compare the time of arrival estimation for consistency with the lead lime.
- Compare the time of arrival and lead time estimations with for reasonable agreement with the information from the Distance/Speed tool.
- Test Level: Conducted at the system level
- Special requirements: None
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step.
- This test will be conducted in conjunction with an AWIPS-1 OB8.3 versus AWIPS Migration TO10 button-mapping exercise for this product.
- Note that TTR's were written against the TO8-2001 test procedures. New problems will be documented and TTR's written, if necessary, but new TO10 TTR's will not be created for known TO9 discrepancies.

### TO10\_2002 - Plot Model Regression Testing

- Test Objective: To validate that the data and format in the plot models of various station report types is consistent with the D-2D's display format. The TO8-2002 test case (which examined METARs and reports from ships, fixed buoys, and MAROBS) will be repeated, and appended with additional data types (e.g., synoptic station reports) if the data and functionality are available. Issues to be examined will include:
  - Presence of fundamental display parameters (temperature, wind speed, dewpoint weather, etc.)
  - Plotting of conditional data (e.g., wind gusts, present weather). Note that the plot models are highly configurable in CAVE, but MDL will try to ensure that the default setup is the same as D-2D's.
  - Comparisons of the plot model data to the raw observation from cursor sampling, to verify that the data is being displayed accurately.
  - Ad hoc comparisons of live data values in CAVE and D-2D, to verify reasonable agreement between the two displays (taking into consideration that information in the displays may differ due to varying station lists, update times, handling of specials/corrections, etc.)
- Test Level: Conducted at the system level
- Special requirements: Live data feeds for METARs, maritime reports, synoptic reports, and MAROBS.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step.

### TO10\_2003 - Time of Arrival/Lead Time Product Button map

- Test Objective: To quantify the TO10 progress in implementing the "Time of Arrival/Lead Time" tool in CAVE, the tester will be required to:
  - Load the application.
  - Document success or failure for each possible selection in the TOA display.
- Test Level: Conducted at the system level
- Special requirements: None
- The type of data to be recorded: Entries, results, estimated TO10 completion percentage, and a pass/fail grade of each test step, nested to reflect interface hierarchies (i.e., a menu selection leads to a submenu, which leads to a display, etc.) The format will conform to previous NWS D-2D mapping exercises.
- This test will be conducted in conjunction with the Time of Arrival/Lead time AWIPS Migration TO10 pass/fail verification exercise for this product. For baseline comparison, a parallel button-map exercise will be conducted for the AWIPS-I Time of Arrival/Lead Time product.

### TO10\_2004 - AVNFPS Button map

- Test Objective: To quantify the progress in implemented TO10 functionality for the AVNFPS tool in the AWIPS Migration software, the tester will be required to:
  - Load the application interfaces.
  - Document success or failure for each possible selection in the interface.

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- Test Level: Conducted at the system level
- Special requirements: Live updates of METARs, TAFs, NLDN lightning strikes, Lightning Probability (from SBN), profiler-derived, low-level wind shear products, and IFPS grids; access to HDF5 climatology data files.
- The type of data to be recorded: Entries, results, estimated TO10 completion percentage, and a pass/fail grade of each step, nested to reflect interface hierarchies (i.e., a menu selection leads to a submenu, which leads to a display, etc.) The format will conform to previous NWS D-2D mapping exercises.
- For baseline comparison, a parallel button-map exercise will be conducted for the OB9 AWIPS-I AVNFPS product (which is very similar to the OB8.3 version)..

### 4.2.3 NCEP Test Cases [Test Case 4000 Series]

NCEP strategy is to run a suite of tests that test capabilities that are of particular relevance to NCEP requirements.

#### 4.2.3.1 Grid Data Test Cases

Assumptions:

- External grid datasets can be imported into ADE for testing purposes.
- Numerical grid values can be output from ADE for comparison purposes.

TO10\_4201 - Global Grid Ingest, Decode and Display Test

- Test object: Verify proper ingest and decoding and display of GFS ½ degree global grid
- Verify that ingest and decoding complete without errors
- Compare decoding of grid is correct by comparing select grid values to NAWIPS decoded values for same grids.
- Verify that global grid displays properly across geographic boundaries
- Verify that CAVE can properly display all GFS forecast times
- Verify that CAVE can properly load and display more than one set of GFS forecast times using D2D pane mechanism
- Verify that CAVE contour and image fill work properly and perform acceptably
- Qualification method: Compare output values for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

TO10\_4202 - NDFD Ingest, Decode and Display Tests

- Test objective: Verify proper ingest, decode, and display of full domain NDFD datasets.
- Verify that ingest and decoding complete without errors
- Verify that CAVE can properly display all forecast times in CAVE
- Compare decoding of grid is correct by comparing select grid values to NAWIPS decoded values for same grids.
- Qualification method: Compare output values for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

TO10\_4203 – Ingest, Decode and Display Grids with Bitmaps/Missing Data

- Test objective: Verify proper ingest, decode, and display of grid datasets with bitmaps and/or missing data
- Verify that ingest and decoding complete without errors
- Compare decoding of grid is correct by comparing select grid values to NAWIPS decoded values for same grids.
- Verify that CAVE can properly display all forecast times in CAVE
- Qualification method: Compare output values for consistency.

## AE TO-10 IV&V Test Plan

- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4301 METAR Decode and Display Test Cases

General assumptions are:

- ADE will allow dumping of raw and decoded METAR data.
- External raw METAR datasets can be imported into ADE.
  
- Test objective: Verify proper ingest, decode, and display of METAR data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4302 TAF Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of TAF data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4303 PIREP Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of PIREP data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4304 AIREP Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of AIREP data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4305 BINLIGHTLING Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of BINLIGHTLING data
- Verify that ingest and decoding complete without errors

## AE TO-10 IV&V Test Plan

- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4306 BUFRUA Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of BUFRUA data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4307 GRIB Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of GRIB data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4308 MODELSOUNDING Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of MODELSOUNDING data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4309 PROFILER Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of PROFILER data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4310 RADAR Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of RADAR data
- Verify that ingest and decoding complete without errors

## AE TO-10 IV&V Test Plan

- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4311 RECCO Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of RECCO data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4312 REDBOOK Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of REDBOOK data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4313 SATELLITE Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of SATELLITE data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4314 SFCOBS Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of SFCOBS data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4315 SHEF Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of SHEF data

## AE TO-10 IV&V Test Plan

- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4316 WARNING Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of WARNING data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

### TO10\_4317 CCFP Decode and Display Test Cases

- Test objective: Verify proper ingest, decode, and display of CCFP data
- Verify that ingest and decoding complete without errors
- Compare decoded values in ADE with decoded values in N-AWIPS for consistency
- Verify that CAVE can properly display decoded data
- Qualification method: Compare decoded values in ADE to corresponding values in N-AWIPS for consistency.
- Special requirements: N-AWIPS shall be used for comparison.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step

## 4.2.4 OHD Test Cases [Test Case 5000 Series]

### TO10\_5101 – SHEF Decoder Parse and Post to the IHFS Database

- Test objective: Verify that all SHEF format reports are being properly decoded and posted to the Integrated Hydrologic Forecast System (IHFS) hydrological database.
- Qualification method: Start the persistent SHEF decoder functions, Confirm that the contents of sample SHEF messages are properly parsed (i.e. decoded) and posted into the appropriate tables of the database in a timely fashion, and that proper logging information is provided.
- Special requirements: SHEF Decoding requirements are detailed in the NWS Directive: *National Weather Service Manual 10-944*, January 2, 2008, Standard Hydrometeorological Exchange Format (SHEF) Manual. The SHEF posting functionality is discussed in SHEF Decoder Operations Guide, dated April 12, 2007 (available at [https://ocwww.weather.gov/intranet/whfs/SHEF/shefdecode\\_manual\\_ob7.doc](https://ocwww.weather.gov/intranet/whfs/SHEF/shefdecode_manual_ob7.doc)).
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step.

### TO10\_5201 – Hydrologic Time Series Viewer

- Test objective: Verify that all the functionality in the AWIPS-I baseline Time Series application is available and working properly.
- Qualification method: Execute the new Time Series implementation. Check that all functionality in the Time Series AWIPS-I application exists in the AWIPS Migration application.
- Special requirements: AWIPS-I Time Series functionality is discussed in the *Time Series Hydrometeorologic Data Viewer Operations Guide*, dated January 23, 2008 (available at [https://ocwww.weather.gov/intranet/whfs/TimeSeries/timeseries\\_guide\\_OB8.3.doc](https://ocwww.weather.gov/intranet/whfs/TimeSeries/timeseries_guide_OB8.3.doc)).

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- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step. Document all discrepancies, especially missing functionality.

### 4.2.5 SEC Test Cases [Test Case 8000 Series]

#### TO10\_8001

- Test objective: Test the throughput and latency of text, satellite, grib and radar messages passing through the ESB layer.
- Test Level: Conducted at the ESB level.
- Test type or class: Performance.
- Qualification method: Inspection.
- Special requirements: NWS provided test driver ESB endpoints.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step.
- The assumptions and constraints are noted in each test procedure in the corresponding STD

#### TO9\_8002

- Test objective: Test the latency of sending text messages with a large number of binary messages going across the ESB.
- Test Level: Conducted at the ESB level.
- Test type or class: Performance.
- Qualification method: Inspection.
- Special requirements: NWS provided test driver ESB endpoints.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step.
- The assumptions and constraints are noted in each test procedure in the corresponding STD.

#### TO10\_0004

- Test objective: Selected Raytheon's OB9 System Integration Testing Test Cases (Table 4-3) to verify D2D, Volume Browser, Skew-T features in TO10.
- The type of data to be recorded: product name, decoder, number of seconds.
- Test Level: Conducted at the subsystem level.
- Test Type/Class: Data Acquisition & Functional Testing

OB9 SIT test case name
Baseline_D2D_Loc_RADAR
Baseline_D2D_Maps
Baseline_D2D_Procedures
D2D_RAOB
Baseline_D2D_Reg_Radar
Baseline_D2D_VB_Xsets
Baseline_D2D_VB_Plan
Baseline_D2D_VB_sound
Baseline_D2D_VB_Time
Baseline_D2D_VB_T-Z_1.4.1.6
Baseline_D2D_VB_XvsZ
Baseline_D2D_volume
Baseline_TextDB
Baseline_TextWks

Table 4-4

#### TO10\_8005

- Test objective: Test the throughput and latency for ingesting and storing text, satellite, grib and radar messages for the current WFO data volume and twice this load.

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- Test Level: Conducted at the ESB level.
- Test type or class: Performance.
- Qualification method: Demonstration.
- Special requirements: NWS provided data sets based on operational WFO systems.
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step.
- The assumptions and constraints are noted in each test procedure in the corresponding STD

### TO10\_8006

- Test objective: Graphics Card memory test. Verify CAVE properly handle overloaded imagery products without problem.
- Test Level: Conducted at the subsystem level.
- Test type or class: functional.
- Qualification method: Visual
- The type of data to be recorded: Entries, results, and a pass/fail grade of each test step.

### 4.2.6 OPS Test Cases [Test Case 9000 Series]

#### TO10\_9001 Active warnings during life cycle

- Test Objective - Verify that WarnGen properly keeps track of currently active warnings during each phase of the warning life cycle. This involves issuing several SVRs and TORs for various durations. At frequent intervals during the warning life cycles, verify that WarnGen provides the proper followup options such as REISSUE, COR, CAN, CON, EXP for each active warning.

#### TO10\_9002 Proper WarnGen format

- Test Objective - Verify that WarnGen creates properly formatted followup products. This involves issuing a TOR and an SVR. During the warning life cycle (REISSUE, COR, CAN, CON, EXP), verify items such as the proper manipulation of the warning polygon, correct VTEC coding, proper locking of WarnGen GUI options, correct time references, storm location updates, etc.

## 4.3 Performance Testing

### 4.3.1 RCP Application Test System (RATS)

#### 4.3.1.1 The following RATS tests will be performed by SEC:

- autotest\_001.pl – Measure time to load and loop IR Satellite
- autotest\_002.pl – Measure time to load and loop model data, radar, and satellite to all panes
- autotest\_003.pl – Measure time to load and loop model data, satellite, and observations to all panes

Results of the RATS tests will be compared to baseline results from OB8.3, TO8, and TO9 to ensure there is no significant performance degradation. Information regarding RATS and the individual test scripts may be found at the AWIPS Evolution Test Website, under “Tools” in the “AWIPS 2 Testing” section:

<http://www.nws.noaa.gov/ost/SEC/AE/Testing.htm>

### 4.3.2 Other Performance Testing

#### 4.3.2.1 Data Ingest Performance Testing

SST will compile Data Ingest and Product Notification metrics for both OB9 and TO10:

- 1) Total number of products
- 2) Average storage time
- 3) Maximum storage time

The above metrics

## AE TO-10 IV&V Test Plan

The rate of data ingest (i.e., volume) will be overlaid on a graphical representation of the storage time to determine if larger products significantly degrade the metrics.

A successful test will occur if both the average storage time and maximum storage time of both the Data Ingest and Product Notification in TO10 are at least as fast as in OB9.

### 4.3.2.2 Graphical User Interface (GUI) Testing

GSD has compiled Performance Metrics for D2D menu items using the OB8.1 software. These metrics, gathered by using a stopwatch, were performed by repeating the tests using one set of canned data and two sets of live data. The response time for each of the D2D menu items was logged in an Excel spreadsheet. Averages were calculated to smooth out spikes and valleys in system performance.

These tests will be repeated using the TO10 software. The detailed results will be summarized and compared to the baseline OB8.1 results and the TO9 test results. It should be noted that due to instability issues, the TO9 testing was performed using a limited suite of ingest data.

A successful test in TO10 will occur if:

- 1) The overall average response time of the GUI is not worse than OB8.1
- 2) There is no "significant" degradation for any of the individual menu items as compared to OB8.1.

Although ideal, it is not a requirement that the GUI metrics be faster than TO9. The full data ingest in TO10 makes a direct comparison with TO9's metrics difficult.

### 4.3.2.3 Data Dissemination Testing

Due to the impending change from mule ESB to camel ESB, the IV&V Team determined that Data Dissemination Performance metrics would not be of value in TO10.

## 5 Test Resources

### 5.1 Team Members

The following organizations/ team members are involved in the IV&V:

- GSD – Carl Bullock, Leigh Cheatwood, Joanne Edwards, James Fluke, Tracy Hansen, Tom LeFebvre, Woody Roberts, Mike Romberg, Joe Wakefield, Susan Williams
- MDL – Michael Churma, Cece Mitchell, Steve Smith, Ken Sperow
- NCEP – Steve Gilbert, David Plummer, Scott Jacobs, Jianning Zeng
- OHD – Mark Fresch, Chip Gobs, Mark Glaudemans, Tom Kretz, Xuning Tan
- OST/SEC – Olga Brown-Leigh, Jim Calkins, Stowe Davison, Brian Gockel, Ira Graffman, Tim Hopkins, Ashley Kells, Thomas McGuire, Oanh Nguyen, John Olsen, Pete Pickard, Bob Rood, Alissa Thomas, Jim Williams
- OCWWS – Mark Armstrong, Randy Rieman, Michael Szkil, Kevin Woodworth
- OPS/SST – Berry Azeem, Neal DiPasquale, Wayne Martin, Jay Morris, Mike Rega

### 5.2 Test Machines

#### 5.2.1 Hardware

##### 5.2.1.1 GSD

The following hardware items are configured as the test computer at GSD:

- Linux – workstation 1 ("WFO" standard specs)
  - Computer: HP xw6200
  - Processors: Dual 2.8 GHz

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- Memory: 2 Gigabyte RAM
- Hard Drive: 32 Gigabyte SCSI
- Video Card: GForce 7600 GT with 256 Megabytes RAM
- Monitor: Three 19" LCD Monitors
- Linux – workstation 2
  - Computer: Dell Precision 380
  - CPU: Intel 3.20 Ghz Piv (Single processor)
  - Hard Disk: Seagate Barracuda 160 Gigabyte Sata
  - CD-Writer Drive: Samsung 52/32/52x
  - Graphics Card: EVGA E Geforce 8400 GS 256 MB
  - Memory: 2 Gigabyte RAM
- Linux – server (3)
  - Computer: Dell Poweredge 2950
  - Processors: Quad-Core Intel Xeon 2.33 GHz
  - Memory: 8 Gigabyte RAM
  - Hard Drive: 146 Gigabyte SAS drive

### 5.2.1.2 NWS HQ

The following hardware items are configured as the test computer at NWS HQ:

- Linux – workstation
  - Computer: HP xw6200
  - Processors: Dual 2.8 GHz
  - Memory: 2 Gigabyte RAM
  - Hard Drive: 32 Gigabyte SCSI
  - Video Card: GForce 7600 GT with 256 Megabytes RAM
  - Monitor: Three 19" LCD Monitors
- Linux - server
  - Computer: Dell Poweredge 2950
  - Processors: Quad-Core Intel Xeon 2.33 GHz
  - Memory: 8 Gigabyte RAM
  - Hard Drive: 146 Gigabyte SAS drive
  - Video Card: G Force 7600 GT with 256 Megabytes RAM
  - Monitor: Three 19" LCD Monitors

## 5.2.2 Software

### 5.2.2.1 GSD

The following software items are configured as the test computer at GSD:

- Linux
  - Red Hat Enterprise Linux (RHEL) 4 u7
  - JAVA 2 version 1.5.0\_04-b05
  - AWIPS OB9

### 5.2.2.2 NWS HQ

- Linux
  - Red Hat Enterprise Linux (RHEL) 4 u2
  - JAVA 2 version 1.5.0\_04-b05
  - AWIPS OB9

## 5.3 Test Facilities

### 5.3.1 GSD test site

The test facility for GSD (FSLC system) is the located in Boulder, CO.

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### **5.3.2 MDL / OHD / OPS test site**

The test facilities NHDA and NHOW are located on the 7<sup>th</sup> floor and 14<sup>th</sup> floor, respectively in SSMC-2, Silver Spring, MD.

### **5.3.3 NCEP test site**

The test facility for NCEP is the NCEP facility, Camp Spring, MD.

### **5.3.4 OST/SEC test site**

Most OST/SEC testing occurs on the NHDA (7<sup>th</sup> floor). Some testing also occurs in the NAPO labortory (12<sup>th</sup> floor). Both facilities are located in SSMC-2, Silver Spring, MD.