DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE
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DEC -1 2009

MEMORANDUM FOR: Neal DiPasquale (Acting)
Director, Field Systems Operations Center

FROM: Jae K. Lee (Acting)
Chief, Test and Evaluation Branch

SUBJECT: Systems Test (ST) Plan for the Radiosonde Replacement System (RRS) Workstation Subsystem (RWS) Build 2.0 software.

Attached for your information is a copy of the subject test plan. The System Test (ST) plan describes the functional tests performed during the ST to verify the enhancements, fixes, and changes in the RRS RWS Build 2.0 software.

An ST Preliminary Meeting (PM) will be called by the Build 2 Manager, to verify all required assets are in place and ready for the ST to begin. A Test Readiness Review (TRR) will be conducted on Wednesday, December 2, to formally begin the ST. Testing will be conducted simultaneously at the National Weather Service (NWS) Headquarters, Silver Spring, Maryland and at the NWS Sterling Field Support Center RRS Test Facility, Sterling, Virginia. Upon successful completion of the ST, the RWS Build 2.0 software will be evaluated at the selected field sites for an Operational Test and Evaluation (OT&E).

Please direct any comments or questions to the ST Director, Aaron Poyer (OPS24) at 301-713-0326 x112, e-mail aaron.poyer@noaa.gov or Jae Lee (OPS24) at 301-713-0326 x158, e-mail jae.lee@noaa.gov.

Attachment

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SYSTEM TEST PLAN

for the

Radiosonde Replacement System (RRS) Workstation Subsystem (RWS) Build 2.0

November 2009

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service/Office of Operational Systems
Field Systems Operations Center/Test and Evaluation Branch

Executive Summary

The National Weather Service (NWS) continues to transition from the current radiosonde system to the Radiosonde Replacement System (RRS). The RRS is used to collect and process upper air data using modern Global Positioning System (GPS) technology. The RRS was initially deployed and is being commissioned using RRS Workstation Subsystem (RWS) software Build 1.2.

RWS Build 2.0 (Build 2) is a maintenance revision to the software correcting numerous issues with the RWS Build 1.2. This software must pass both a System Test (ST) and an Operational Test and Evaluation (OT&E) before use at NWS field sites is permitted. The software is authorized by Request for Change # RRS-OPS22-10-01 (RC). Build 2 consists of various changes such as:

a. Change from Microsoft Jet database engine (Access format) to Microsoft SQL Server Express 2008;
b. New plot functionalities;
c. Use of Active Directory is a new feature in Build 2.0. This will be used to authenticate users and for monitoring and updating the systems via National Oceanic and Atmospheric Administration Wide Area Network (NOAAnet) at each upper air facility associated with a Weather Forecast Office (WFO).

Refer to Section 2.2 for a more complete list of the software changes in RWS Build 2.0.

This plan describes the ST's strategy and conduct. The Office of Operational Systems, Field Systems Operations Center, Test & Evaluation Branch (OPS24) is responsible for the planning, conduct, and reporting of the ST. An ST Preliminary Meeting (PM) will be called by the Build 2 Manager, to verify all required assets are in place and ready for the ST to begin. A Test Readiness Review (TRR) will be conducted on Wednesday, December 2, to formally begin the ST. The ST will be conducted at the National Weather Service Headquarters (WSH) in Silver Spring, Maryland; and the NWS Sterling Field Support Center (SFSC) in Sterling, Virginia. The National Centers for Environmental Prediction (NCEP) in Camp Springs, Maryland; and the National Climatic Data Center (NCDC) in Asheville, North Carolina, will support the end-to-end tests and provide analytical support. In order to fully evaluate the software's capabilities, a NOAAnet connection with an Active Directory configuration will be required on the test systems at WSH and SFSC.

During the ST, a Test Review Group (TRG) consisting of NWS personnel, NCDC, NCEP, and field personnel, will meet weekly (Wednesdays) to discuss the status of the testing, review ST activities, and to adjudicate reported System Issue Reports (SIRs). SIRs created during the ST will be tracked using the TestTrack Pro database, and will be addressed during the TRG meetings for assignment and resolution. Each of the SIRs will be classified with a specific Priority and Impact.

At the conclusion of the ST, a wrap-up meeting will be conducted by OPS24 to provide the TRG with all the test results, including the status of all of the reported SIRs. Based on the test results and SIR status, the TRG will recommend whether to proceed with the OT&E.

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Acronyms & Abbreviations

AO	Authorizing Official
ATO	Authority To Operate
AWIPS	Advanced Weather Interactive Processing System
C	Celsius Temperature Scale
CCB	Configuration Control Board
CD	Compact Disc
CDU	Control Display Unit
CPU	Central Processing Unit
dBm	Decibels (dB) of measured power referenced to one milliwatt (mW)
EHB	Engineering Handbook
FSOC	Field Systems Operations Center
GPS	Global Positioning System
GUI	Graphical User Interface
hPa	Hecto-Pascal
KLWX	WMO identifier for the Baltimore, MD/Washington, DC WFO
km	Kilometer
kts	Knots
LAN	Local Area Network
LDAD	Local Data Acquisition and Dissemination
LRU	Line Replaceable Unit
LWX	National Weather Service identifier for the WFO Baltimore, MD/Washington, DC
NCDC	National Climatic Data Center
NCEP	National Centers for Environmental Prediction

NHDA	National Headquarters Integration and Test System for AWIPS Advanced Software
NMTW	National Headquarters Modernization Test and Integration System, WFO
NOAAnet	The National Oceanic and Atmospheric Administration Wide Area Network
NWS	National Weather Service
NWSM	National Weather Service Manual
NWSPD	National Weather Service Policy Directive
NWSTG	NWS Telecommunication Gateway
OPS11	NWS Engineering and Acquisition Branch
OPS12	NWS Maintenance Branch
OPS13	NWS Configuration Branch
OPS21	AWIPS Support Branch
OPS22	NWS Observing Systems Branch
OPS23	NWS Software Branch
OPS24	NWS Test and Evaluation Branch
OS7	NWS Observing Services Division
OT&E	Operational Test and Evaluation
PAMS	Product Availability Monitoring System
PDB	Precision Digital Barometer
PM	Preliminary Meeting
RC	Request for Change
RH	Relative Humidity
RRS	Radiosonde Replacement System
RSOIS	Radiosonde Surface Observation Instrumentation System

RWS	RRS Workstation Subsystem
SFSC	Sterling Field Support Center
SIR	System Issue Report
SPS	Signal Processing Subsystem
SRG	System Requirements Group
SSP	System Security Plan
ST	System Test
SQL	Structured Query Language
TRG	Test Review Group
TRR	Test Readiness Review
TRS	Telemetry Receiver Subsystem
UPS	Uninterruptible Power Supply
VDD	Version Description Document
WFO	Weather Forecast Office
WMO	World Meteorological Organization
WSH	National Weather Service Headquarters
XDP	External Data Pump

1.0 Introduction

The National Weather Service (NWS) continues to transition from the current radiosonde system to the Radiosonde Replacement System (RRS). The RRS is used to collect and process upper air data using modern Global Positioning System (GPS) technology. The RRS was initially deployed and is being commissioned using RRS Workstation Subsystem (RWS) software Build 1.2 with Ghosting CD version 1.08 (Build 1.2).

RWS Build 2.0 (Build 2) is a maintenance revision to the software correcting numerous issues with the RWS Build 1.2. This software must pass both a System Test (ST) and an Operational Test and Evaluation (OT&E) before use at NWS field sites is permitted. The software is authorized by Request for Change # RRS-OPS22-10-01 (RC). Build 2 consists of various changes such as:

a. Change from Microsoft Jet database engine (Access format) to Microsoft SQL Server Express 2008;

b. New plot functionalities;

c. Use of Active Directory is a new feature in Build 2. This will be used to authenticate users and for monitoring and updating the systems via National Oceanic and Atmospheric Administration Wide Area Network (NOAAnet) at each upper air facility associated with a Weather Forecast Office (WFO).

Refer to Section 2.2 for a more complete list of the software changes in Build 2.

This plan describes the ST's strategy and conduct. The Office of Operational Systems, Field Systems Operations Center, Test & Evaluation Branch (OPS24) is responsible for the planning, conduct, and reporting of the ST. An ST Preliminary Meeting (PM) will be called by the Build 2 Manager, to verify all required assets are in place and ready for the ST to begin.

A Test Readiness Review (TRR) will be conducted on Wednesday, December 2, to formally begin the ST. The ST will be conducted at the National Weather Service Headquarters (WSH) in Silver Spring, Maryland; and the NWS Sterling Field Support Center (SFSC) in Sterling, Virginia. The National Centers for Environmental Prediction (NCEP) in Camp Springs, Maryland; and the National Climatic Data Center (NCDC) in Asheville, North Carolina, will support the end-to-end tests and provide analytical support. In order to fully evaluate the software's capabilities, a NOAAnet connection with an Active Directory configuration will be required on the test systems at WSH and SFSC.

1.1 Test Plan Organization

This Test Plan is comprised of six sections:

- Section 1 contains introductory materials describing the purpose of the test, the test objectives, the testing strategy, and the prerequisites for the ST.
- Section 2 describes the system under test and the components of the system.
- Section 3 discusses the management of the test including the roles and responsibilities of the personnel participating in the ST.
- Section 4 describes the processes and procedures employed during the ST including the test schedule, test methodology, and the test related activities being performed.
- Section 5 describes the evaluation of the test objectives and the analysis of the test results.
- Section 6 describes the final recommendation and the test report.

Included in this test plan are the following appendices:

- Appendix A, WSH Test Procedure Checklist;
- Appendix B, SFSC Test Procedure Checklist;
- Appendix C, Procedure Descriptions;
- Appendix D, Test Review Group Personnel;
- Appendix E, RWS Build 2.0 Software Changes;
- Appendix F, RRS System Certification Form;
- Appendix G, SFSC RRS System 7 Station Data; and
- Appendix H, Complete Test Schedule.

1.2 Purpose

The purpose of the ST is to test RWS Build 2 in a simulated and controlled operational environment and to ensure Build 2 is fully functional, reliable and ready for operational testing at the selected OT&E sites. The ST process is also to ensure that Build 2, being a system upgrade from the commissioning load, Build 1.2 with Ghosting CD version 1.08 (Build 1.2), demonstrates all capabilities of Build 1.2 including the additional upgrades new to Build 2.

In order to verify that all methods of system installation and usage are valid and properly functioning and to ensure the accuracy of the Software Modification Note and User's Guide

Build 2 will be evaluated under four distinct configurations, described in Section 4.3.1. All four configurations will be tested in two phases, described in Section 4.3.2.

These configurations will include an installation to simulate upgrading a currently commissioned system, running Build 1.2, and a setup simulating a new system installation. Both of these installations will then be evaluated under the two connectivity methods. The first connectivity method is to simulate a remote site which is not co-located with a WFO. This system will not be connected to NOAAnet and therefore Active Directory is not configured. The second connectivity method is to simulate an installation of a system co-located with a WFO. This system will be on NOAAnet with Active Directory configured. For further information on the four configurations refer to Section 4.3, Test Methodology

1.3 Test Objectives and Evaluation Criteria

The ST must meet the following evaluation criteria for each test objective:

a. **Validate installation and functionality documentation, listed in section 1.5.1(g).**
   CRITERIA: All documents listed are available and accurate. The documents will include sufficient description of required steps to install software and exercise system functionalities. SIRs will be written to document any recommended modifications. Refer to Section 1.5.1(g) for further explanation of the documentation. Note: Installations will be performed on both a system being upgraded from Build 1.2 as well as a new system.

b. **Validate Active Directory configuration and controls.**
   CRITERIA: Successful connection to NOAAnet and configuration of Active Directory followed by the successful completion of the Active Directory procedures by logging-in and exercising the RWS Build 2 under all possible user account types and verifying no changes occur to account configurations or permissions during testing. The ability to monitor and update the system via the NOAAnet connection is successful. Refer to Appendices A and B for a list of the procedures to be completed, and Appendix C for a description of the test procedures.

c. **Validate RWS Build 2 performs all RWS functions correctly in accordance with the standard practices in place at current operational locations.**
   CRITERIA: Successful completion of the test procedures for each test case and successful operational usage of the software by the ST test team. Passing of all test procedures will confirm Build 2 to be performing all aspects of Build 1.2 including new functionalities. Positive evaluations by the ST test team during the "free play" period may validate build 2 functions as improvements over build 1.2 functions.

d. **Validate end-to-end communications with and without NOAAnet and Active Directory.**

CRITERIA: Successful transmission and ingest of products to AWIPS, NCEP, and NCDC using both configurations with NOAAnet and Active Directory and without the use of NOAAnet and Active Directory as defined in Section 4.3.

e. **Assess the operational usability of RWS-generated data and products by a limited set of operational applications.**
CRITERIA: Successful product output and operational usability of these products as determined through analysis by OS7, OPS21, OPS22, field staff and other subject matter experts. Data displays and product formats will be transmitted to NCDC for quality control, coded messages to NCEP, and Skew-T plots to AWIPS are available and accurate.

f. **Validate the accuracy of the new RWS Plot capability with special emphasis on the RWS Skew-T plot versus the AWIPS Skew-T plot.**
CRITERIA: The new RWS plot capabilities are available and functioning successfully. The RWS Skew-T plots and AWIPS Skew-T plots are verified as comparable. Product generation and operational usability are confirmed successful by subject matter experts.

g. **Successful completion of live flights at the Sterling Field Support Center.**
CRITERIA: Successful completion of at least 50 live flights performed at the SFSC. These flights will include both LWX flights tracked at the SFSC and special flights performed by the SFSC. In order to qualify that the flight is successful, it must not terminate due to any software related issues and must reach the height of the initial coded message generation (400hPa).

1.4 System Test Strategy

Prior to beginning the ST, the ST Director (see Section 3.2) will host a Test Readiness Review (TRR) which will verify RRS Build 2 is ready for the ST. The TRR will discuss and verify the availability of the items (i.e., hardware, software, and documentation) needed to begin the ST. The RRS System Certification Form identifies the personnel responsible for providing items from the list. Appendix F contains the RRS System Certification Form, to be completed prior to the TRR. The ST TRR will be attended by the ST TRG members identified in Appendix D.

At the ST Readiness Review, the responsible office will provide the ST Director with:

a. Request for Change (OPS22);

b. The RWS Build 2 software and Ghosting CD version 1.08 for use during the ST (OPS22);

c. RRS system certifications (Appendix F); and, firmware versions contained in each RRS subsystem for all test systems (OPS11/OPS23);

d. The latest versions of support software (External data Pump (XDP) software, configuration files, etc...) (OPS23); and

e. Other Draft documents (OPS11/OPS12/OPS23/OS7), refer to Section 1.5.1.

During the ST, the RWS Build 2 TRG will meet weekly or as called by the ST Director if an emergency SIR is found. The TRG will discuss progress and adjudicate any problems found. All problems will be segregated into RWS software, hardware, or radiosonde related issues as follows:

a. RWS Build 2: All RWS software problems will be submitted to the TRG to adjudicate the impact level of the encountered problem. The TRG then will submit software problems to the System Requirements Group (SRG) (Chaired by Carl Bower, OPS22). The SRG will assign a priority to each problem, and forward software problems to the RWS Build 2 Manager to determine a resolution and scheduling. Once the Impact 1 SIRs are resolved, the Build 2 Manager will approve the revised software build for further ST testing. The Build 2 Manager will provide the revised Build 2 software to the ST Director for installation in the RWS test systems, and the ST will resume. Regression tests of new software build will be completed as required.

   For non-critical software problems, Impact 2−6, the ST will continue while the SRG and the RWS Build 2 Manager determine prioritization, how and when the problem(s) should be resolved including which future software build will contain the fix.

b. Hardware: All hardware problems will be addressed by the RRS Program Manager (D. Bosco, OPS11). RRS hardware failures in any of the subsystems that do not have a reasonable work around may require suspension of testing until the RRS Program Manager can address the problems.

c. Radiosonde: Radiosonde failures will be handled similarly to RRS Hardware failures. However, if a radiosonde failure is due to a single faulty radiosonde a new release will follow the attempted (failed) release, pending availability of radiosondes.

d. IT Security: Any encountered IT Security issues will be brought to the attention of the Information Systems Security Officer (ISSO) for guidance and potential adjudication during all phases of the ST.

If the problem is Impact 1 (i.e., a hardware or software problem which cannot be repaired within a reasonable time) and occurs between scheduled TRG meetings, the ST Director will stop ST testing and immediately call an emergency meeting of the TRG. The TRG will decide whether the ST should be suspended or continue. Details on how the ST will be performed are described Section 4.4.3, System Test Conduct.

The ST will be considered complete when all the scheduled tests have been successfully performed with no major problems identified (no outstanding Impact 1 or 2 SIRs).

Since the RRS is an adjunct system connected to the Advanced Weather Interactive Processing System (AWIPS), overall product throughput may be measured by the Product Availability Monitoring System (PAMS). In addition to the PAMS data, OS7 and OPS22 will conduct an analysis of the usual data collected to develop RWS Build 2 performance characteristics similar to those of the current software build.
At the successful completion of the ST, OPS24 will conduct a wrap-up meeting to present a summary of the ST results. The TRG will recommend to the RRS Program Manager whether to proceed with the formal OT&E.
Following the ST, the ST Director will generate a report documenting the ST with conclusions and recommendations. The report will include (but not be limited to) RWS configurations, test participants, test results, all problems observed with solutions or work-arounds, and the product analysis from both NCEP and NCDC.

Refer to Section 4.3, Test Methodology, for a full description of the test configurations and test phases.

1.5 Prerequisites, Assumptions, and Risks

This section describes the actions that must precede the ST; the availability of equipment needed for the ST; and a description of risks associated with performing the ST.

1.5.1 Prerequisites

Before proceeding with the RWS Build 2 ST, the following prerequisites must be demonstrated:

a. A RWS Build 2 ST Request for Change (RC) is approved;

b. No outstanding Impact 1 or 2 SIRs (refer to Section 3.1, Table 1: SIR Impact and Priority Categories);

c. A Test Readiness Review is conducted by OPS24 and the system is determined ready to begin the ST. During the review, OPS11, OPS22, and OPS23 will provide OPS24 with complete system certifications of the WSH RWS and the SFSC RRS Systems to include all subsystem and LRU version numbers;

d. Two RRS Workstations identified as the System Test systems have been connected to NOAANet, and Active Directory has been set up and confirmed operational, one system at WSH and one system at SFSC; and

e. The Benchmark tests have been successfully completed, and the algorithms have been validated; and

f. A Security Vulnerability Scan must be successfully completed with no High Vulnerabilities observed; and

g. All required Build 2 draft documentation is available and provided to OPS24. RRS/RWS support documentation, hardware/software installation, and operational instructions will be used in the ST. Reference to these documents will be made as required throughout the test. The list of documentation and procedures includes, but is not limited to:

   i. RWS Build 2 Version Description Document (OPS23);

   ii. Draft RRS Build 2.0 Workstation User's Guide (OPS11);

   iii. Draft RRS Software Note 10 (OPS12/OPS23);

   iv. Engineering Handbook (EHB) EHB-9-730-S2 (EHB-9) Update (OPS12) (https://www.ops1.nws.noaa.gov/Secure/ehbs/EHB9/ehb9toc.htm);

1.5.2 Assumptions and Limitations

The ST has following assumptions and limitations:

a. Sufficient field and headquarters personnel will be available to assist with conducting live flights and analyzing the flight data;

b. It will be possible to jointly track Baltimore, MD/Washington, DC Weather Forecast Office (WFO LWX) synoptic and special flights utilizing the SFSC RRS System 7 equipment;

c. There are a sufficient number of radiosondes and other resources available for ST use;

d. The ST will be performed utilizing the radiosondes available at operational field sites during the ST.

e. There will be **no** hardware changes to the system. Testing will be conducted for software changes only.

1.5.3 Risks

a. Due to manufacturing issues, there might not be a sufficient number of radiosondes available for ST use; and

b. Since not all seasonal weather variations will exist during the scheduled test period, simulating these conditions will introduce a degree of uncertainty; and

c. The RRS System 7 to be used at SFSC is not an idealized operational configuration. The tracking dome, TRS, is installed on the ground; and

d. Due to travel costs and potential scheduling conflicts there might not be a sufficient number of field personnel for test support; and

e. Changes in the RWS Build 2 data processing will produce slightly different results than RWS Build 1.2 data processing, precluding any direct comparisons.

2.0 RRS Subsystems

The Radiosonde Replacement System hardware is comprised of many component subsystems and a software package for the workstation subsystem. The following sections give an overview of the hardware subsystems and a summary of the software subsystem changes to be tested during the ST.

2.1 Description

The RRS consists of the following major subsystems:

a. Radiosonde Surface Observation Instrumentation System (RSOIS) and Precision Digital Barometer (PDB) – collects pre-release surface data. Note: ASOS data can be manually entered as the surface data if no RSOIS is available.

b. Telemetry Receiving System (TRS) and associated Uninterruptible Power Supply (UPS) – tracks the Global Positioning System (GPS) radiosonde and receives radiosonde telemetry signal; the UPS allows radiosonde tracking and data collection to continue in the event of local power failure.

c. Signal Processing System (SPS) – translates the telemetry signal into displayable upper air parameters, (received and processed).

d. GPS radiosondes – allow upper air data to be determined from differential triangulation and other data transmitted by the 24-satellite GPS constellation. This data includes such aspects as wind speed and direction, latitude, longitude, geometric height, thermodynamic data etcetera.

e. RRS Workstation (RWS) – allows RRS operators to receive and process data from the TRS, SPS, RSOIS, and PDB. The RWS controls the TRS, and displays raw and processed data from the GPS radiosondes. The RWS also disseminates formatted products to the AWIPS. The primary software under test will be RWS Build 2.0.x (where "x" is an incremental software update). After the ST, the approved build delivered to the OT&E sites will be designated as 2.0.

2.2 Summary of RWS Software Changes

RWS Build 2 is a migration of the existing RWS software to the Microsoft .NET Framework, which provides improved robustness, performance, and efficient software maintenance. It will also provide a new plotting capability. The software changes tested during this ST constitute a major RRS software release. As such, the software changes are of major consequence. For a complete list refer to Appendix E. The most significant changes include:

a. Change from Microsoft Jet database engine (Access format) to Microsoft SQL Server Express 2008;

b. New plot functionalities;

c. Use of Active Directory to control user accounts authentication;

d. Archive utility to automate NCDC data transfer;

e. RWS ready to support the use of high resolution data transfer;

f. RWS Support of new radiosonde/SPS types;

g. User configurable layouts for all windows and data process grids;

h. More parameters available in the flight summary;

i. Help function (online user's manual);

j. Improvements to the hardware status reporting capabilities;

k. Section 508 compliance;

l. Changes to the user interface;

m. Changes to the data processing techniques;

n. Changes in the status message creation and information displayed;

o. Changes in the check message creation and information displayed;

Note: The full list of software changes made in RWS Build 2 is included in Appendix E.

3.0 Test Management

The following sections define and describe the TRG, the Test Team, the Test Partners and their associated roles.

3.1 Test Review Group (TRG) Role

The TRG is a group of subject-matter experts and is chaired by the Chief, Test and Evaluation Branch (OPS24) or designee. The role of the TRG is to evaluate each observed deficiency (both repeatable and intermittent problems) as documented by a SIR. If any abnormalities are observed during test procedure conduct, SIRs will be written to document the problem and will be provided to the TRG for adjudication. For RRS testing purposes, SIRs are categorized in terms of (a) how the documented problem is likely to **Impact** the WFO's ability to produce a successful upper air observation and (b) the **Priority** to be placed on efforts to correct the problem. The **Impact** (numbered 1 through 6) and **Priority (**numbered 1 through 5) categories are identified in Table 1.

Table 1: SIR Impact and Priority Categories

	Impact	Priority	Comments
1	Prevents successful observation; no workaround	Needs immediate emergency fix	Needs to be completed for successful test completion (ST or OT&E as appropriate).
2	Prevents successful observation; reasonable workaround	Include in next maintenance release	Needs to be completed for successful test completion (ST or OT&E as appropriate).
3	Less critical degradation of data	Include in a future maintenance release	Not needed to complete the current test (ST or OT&E). Target Build 2.1 or later (after Build 2.0 in operation).
4	Degradation of system capabilities; no data effect	Include in next major build	Not needed to complete the current test. Target Build 3
5	Minimal to no impact; nice to have	Undetermined	Not needed to complete the current test (yet to be determined).
6	Undetermined	N/A	Needs further investigation. Impact and Priority are yet to be classified.

A Priority 1 SIR would be direction to issue an immediate maintenance release. All Priority 2 SIR items would accumulate until the TRG decides to integrate a new release into the current test cycle (stay in ST or OT&E as appropriate).

During the ST, the TRG Chair will convene the TRG weekly to:

a. Review, clarify and validate deficiencies documented in SIRs;

b. Prioritize and validate all submitted SIRs and recommend corrective actions to the RWS Build 2 Manager and the RRS Program Manager and determine if they warrant being submitted to the RRS CCB;

c. Coordinate the resolution of other test-related issues.

If an Impact 1/Priority 1 problem occurs between weekly meetings and requires a vote of the members whether to continue the ST, the ST Director shall convene an emergency TRG meeting.

Validated deficiencies will be categorized as follows:

a. Impact 1 – A problem preventing the accomplishment of a successful observation or the deficiency jeopardizes safety, security, or other critical requirements; no work-around exists.
ACTION**:** The TRG recommends suspension of the ST to the RWS Build 2 Manager and RRS Program Manager. If suspended, the ST resumes when the RWS Build 2 Manager and the RRS Program Manager approves a proposed corrective action. When an approved corrective action is implemented, regression testing may be required. Regression testing refers to retesting of all potentially impacted aspects of the software to ensure that no unintended failures occur.

b. Impact 2 – A problem preventing the accomplishment of a successful observation; a reasonable work-around exists.
ACTION**:** The TRG recommends continuation or suspension (depending on the situation) of the ST to the RWS Build 2 Manager and the RRS Program Manager. If suspended, the ST resumes when the RWS Build 2 Manager and the RRS Program Manager approves a proposed corrective action. When an approved corrective action is implemented, regression testing may be required.

c. Impact 3 – Less critical degradation of data; a problem resulting in a successful observation generation but with degradation of data.
ACTION**:** The ST continues with the current system using a work-around until a permanent fix is available. Once the RWS Build 2 Manager and the RRS Program Manager approve the fix, and the approved corrective action is implemented, regression testing may be required.

d. Impact 4 – A minor problem resulting in degradation of system capabilities, but does not affect data.
ACTION**:** The ST continues with the current system; approved work-around may be implemented. Impact 4 deficiencies are submitted by the TRG to the RRS Build 2 Project Manager and the RRS Program Manager for adjudication.

e. **Impact 5** – Minimal to no operational impact; nice to have.

f. **Impact 6** – Undetermined; the person writing the SIR does not know what impact the deficiency entails. The TRG will adjudicate the operational impact and priority and take appropriate action as described above.

The TRG will be composed of the personnel identified in Appendix D. Those individuals will determine if the ST should be suspended. Following completion of a successful ST (i.e., no outstanding Impact 1 or 2 SIRs), the TRG will convene to review the findings, at which time a majority vote will be conducted to recommend to the RWS Build 2 Manager (Commissioned systems owner) and the RRS Program Manager whether to proceed with the OT&E. The TRG may not submit a recommendation to the RWS Build 2 Manager and the RRS Program Manager to proceed to the OT&E if there is any unresolved Impact 1 or 2 SIRs.

3.2 Test Team and Roles

The RWS products are used by many groups internal to and external from the NWS. In order to better evaluate all aspects of the upgrade to Build 2 it is necessary to include some of these branches, groups and agency's expertise; therefore the Build 2 ST test team includes personnel from various NWS branches and other organizations. Having test team members with different areas of expertise will create a smoother and more successful ST process. The following sections describe the RWS Build 2 ST team and roles. The members of the ST Test Team are listed in Table 2.

Table 2: Test Team

Name/Organization	Function	Phone	E-mail
Aaron Poyer (OPS24)	Test Director	301-713-0326 x112	aaron.poyer@noaa.gov
Harry Tran (OPS24)	Test Team	301-713-0326 x105	harry.tran@noaa.gov
Bert Viloria (OPS24)	Test Team	301-713-0326 x131	bert.viloria@noaa.gov
Nick Schmid (OPS11)	Test Team (Documentation)	301-713-1795 x203	nick.schmid@noaa.gov
Kenneth Clark (OPS12)	Test Team (Documentation)	301-713-1833 x190	kenneth.clark@noaa.gov
Kevin Kay (OPS23)	Test Team (Software)	301-713-0191 x171	kevin.kay@noaa.gov

Name/Organization	Function	Phone	E-mail
James McNitt (OPS22)	Test Team (System Requirements)	301-713-2093 x102	james.mcnitt@noaa.gov
Carl Bower (OPS22)	Test Team (System Requirements)	301-713-2093 x115	carl.bower@noaa.gov
Bill Blackmore (OPS22)	Test Team (Product Analysis)	301-713-2091 x107	william.blackmore@noaa.gov
Don Johnson (OPS22)	Test Team (Flight Operations)	301-713-2093 x172	donald.johnson@noaa.gov
Ashby Hawse (OPS22)	Test Team (Flight Operations)	703-661-1222	ashby.hawse@noaa.gov
Wayne Martin (OPS21)	Test Team (AWIPS)	301-713-1724 x166	Wayne.martin@noaa.gov
Bradley Ballish (NP12)	Test Team (NCEP)	301-763-8000 x7104	bradley.ballish@noaa.gov
Stuart Hinson (CC21)	Test Team (NCDC)	828-271-4437	Stuart.Hinson@noaa.gov
Field Personnel	Test Team (Field Personnel)		

* The specific Field personnel assisting in the ST will be indentified prior to the conduct of the ST.

The following describes the major roles and responsibilities of the test team:

Test Director – Ensures all tests defined for the ST are completed and the results properly documented in the ST report. The ST Director is responsible for collecting and presenting all SIRs to the TRG for classification and convening emergency TRG meetings, if necessary. Following completion of the ST, the ST Director will conduct a "wrap-up" meeting of the TRG, provide details of the ST to the RWS Build 2 Manager and the RRS Program Manager, report the ST conclusions, and recommend whether to proceed with the OT&E. Ensures all SIRs documented and classified during the ST are forwarded to the proper WSH organization or board for adjudication; writes the ST report to document the test results and recommendations. The Test Director also serves as a member of the test team.

Test Team – Responsible for performing individual test procedures as assigned; documents the results of each test in test logs; electronically completes SIR forms when problems/discrepancies are observed. When requested by the ST Director test team members will attend and brief the TRG with comprehensive technical information on how the tests were conducted and any problems encountered. Further responsibilities include providing technical support, analysis and information, as requested by the ST Director, when RRS questions arise; dependent upon each member's area of expertise. The Test Team members also provide technical expertise in their

areas of specialty; such as systems requirements, information security, systems hardware, systems software, flight operations, data analysis, systems communications, and system documentation. The Test Team will break into the following sub-teams based on the areas of expertise required for a successful ST:

- **Documentation Test Team** – Responsible for providing testing and support in interpretation and execution of the instructional documentation.

- **Software Test Team** – Responsible for supporting the other team members with, and investigating, any software related issues that may arise during ST.

- **System Requirements Test Team** – The Systems Requirements Team is comprised of experts in information security and system functional requirements. This team is responsible for verifying all systems requirements are met and providing guidance on any system requirements discrepancies or IT security vulnerabilities encountered during ST.

- **Product Analysis Test Team** – The Product Analysis Team is responsible for testing and support in determining whether the format and functionality of the RWS flight products are compatible with the mission of the RRS; this would include analysis and verification of the data processing, plot formats, WMO coded messages, and the Skew-T plots. Further responsibility includes supporting analysis in determining whether the Skew-T plot on AWIPS reflects the same information as RWS in the instance of a corrected message being sent.

- **Flight Operations Test Team** – Responsible for providing daily flight operations with SAIC support, as required, and providing software and hardware expertise during flight operations. The Flight Operations test team will also document any RRS hardware and software discrepancies encountered during flights. The flight operations team will attend and brief the TRG with comprehensive technical information on the flight operations and any problems encountered.

- **AWIPS Test Team** – Responsible for configuring an AWIPS workstation to ingest data for Test WMO Site ID 69990 (KSTA) and providing testing and support of the end-to-end communications. AWIPS test team members will also make the AWIPS Skew-T plots available for further analysis by product analysis test team and other subject matter experts.

- **NCEP Test Team** – Responsible for evaluating RRS products for format and usability in meteorological models and performing quality control checks. Specifically; under controlled conditions, members of the NCEP test team, from the Environmental Modeling Center, will attempt to open and quality control the RWS data products in order to verify them usable in the NCEP meteorological models. If the products are properly formatted and found to be of an acceptable level for use in the models, Build 2 will have passed this portion of the ST. NCEP will compare the RRS Build 2 products with official products from WFO LWX, using Build 1.2.

- **NCDC Test Team** – Responsible for determining if archived RRS atmospheric data from radiosonde flights is in the proper format and is usable in NCDC climatic products. The submitted data is considered successful if NCDC can read the archived data and use it to produce climatic products.

- **Field Personnel Test Team** – Responsible for determining if the functionality of the RWS Build 2 is compatible with field style operations, and performs all functions of Build 1.2 as well as all added functionality. The field personnel will exercise the graphical user interface (GUI) and other aspects of the user operations (plots, plot overlays, rework, etc...). It is reasonably expected that field personnel would spend 1 work week at the SFSC facility.

4.0 Test Schedule, Resources, Methodology and Conduct

The following sections provide a description of the schedule, resources, configurations, and methods for the conduct of the ST. It will be the responsibility of the ST Director to ensure the test is performed as outlined. Any deviation from the test methodology will be documented in the ST report. If there are any changes to the ST procedures, the changes will be provided to the ST test team prior to conduct of the affected tests.

4.1 Test Schedule

The ST will be conducted in accordance with the following schedule, refer to Appendix H for a complete schedule:

Table 3: ST Schedule

Event	Start	Duration*
Preliminary Meeting (PM) at WSH	Wednesday, 11/10/2009	1 day
Test Readiness Review (TRR) at WSH	Wednesday, 12/02/2009	1 day
Conduct System Test		
Phase I Conducted at WSH & SFSC	Wednesday, 12/02/2009	7 weeks
Phase II Conducted at SFSC.	Monday, 01/25/2010	4 to 5 weeks
"Wrap-Up" meeting at WSH.	Wednesday, 03/03/2010	1 day

*Note: The duration may vary depending on holidays and other factors.

4.2 Test Resources

The following describes the resources required for the ST which includes both the hardware and software needed for the two systems at WSH and one system at SFSC.

4.2.1 WSH Hardware/Software

An RWS workstation located in the OPS24 Integrated Test Bed in the 6th floor lab at WSH will be used during ST with an External Data Pump (XDP) interfaced to the RWS. The XDP has the capability to "replay" captured data sets from previous upper air flights with specific weather conditions from around the country. If particular anomalous upper air flights are not available, special data sets may be manually created by modifying real flights to provide anomalous weather conditions (i.e., specific periods or types of missing data, out of range sensor data, etc.) to check for specific error conditions. There will be no transmission to the AWIPS or test AWIPS during the WSH portion of the ST. This system will be tested with both methods of software installation and with and without a connection to NOAAnet and Active Directory configured.

Another test systems utilizing the same type of XDP setup will be in room 4402 at WSH, this system will also include QA Wizard Pro (QA), from Seapine Software, in order to automate some of the required test procedures. The use of this automated quality assurance software will increase the efficiency of certain types of test procedures which will allow for a greater number of scenarios to be evaluated in a shorter period of time. A list of the procedures to be completed using QA can be found in the list of procedures to be run at WSH, Appendix A. This system will not be connected to NOAAnet.

Note: The test World Meteorological Organization (WMO) site identifier for the WSH RRS is 69001. This test WMO identifier will only be used during ST on the test systems at the WSH.

4.2.2 SFSC Hardware/Software

The RRS System 7 has been identified as the system for the ST. In addition, a dedicated swappable hard drive will be used to control software versions during the ST.

During the ST, "live" test upper air flights will be conducted at the SFSC. In addition, flights launched by the WFO LWX personnel at Sterling, Virginia will be tracked utilizing the RRS System 7 at the SFSC. These flights will reduce the cost of radiosondes while utilizing the ability to track same radiosondes simultaneously with both Build 1.2 and Build 2.

- The test WMO site identifier for the SFSC test system, which will be used to track radiosondes with Build 2, is 69990 (KSTA). This test WMO identifier will only be used during ST on the test system at the SFSC.

- The WMO site identifier for the WFO LWX operational upper air system (running Build 1.2) is 72403. Data from LWX messages will be used by the test team to compare to the data transmitted by Build 2 from the RRS system 7.

The station data will be modified manually using the Master Edit Utility when the system will be used for tracking flights from WFO LWX. Refer to Appendix G for Station Data information.
This system will be tested with both methods of software installation and with and without a connection to NOAAnet and Active Directory configured. In addition, user authentication, system monitoring and updating via NOAAnet will be tested.

The WSH AWIPS test systems, National Headquarters Modernization Test and Integration System, WFO (NMTW) and the National Headquarters Integration and Test System for AWIPS Advanced Software (NHDA) will be used to receive test messages from the RWS connected to RRS System 7.

Members of both the NCEP and NCDC test teams will assist in examining the usability of the RRS products. NCEP will determine if the atmospheric data is usable in their meteorological models; NCDC will determine if the archived climatological data can be retrieved and used in their products. Members of the Data Analysis test team will also be evaluating applicable products.

4.3 Test Methodology

4.3.1 Installation and Configurations

Two methods of installation used will be performed during the Phase I of the ST. The first method will be installing build 2 on a system with no previous versions of RWS which will simulate installation at a newly deployed RRS facility. The second method will be installing Build 2 over a system previously running the commissioning load of Build 1.2 with Ghosting CD version 1.08 which will simulate the installation at an existing RRS site that has completed the commissioning process, including a completed Security Vulnerability Scan with no high vulnerabilities encountered, and is being upgraded to the Build 2.

The installations will take place by using the Ghosting CD (version 1.08) provided at the TRR.

Build 2 will be installed at WSH the day after the TRR using the RRS Software Note 10. Upon successful completion of the installation at WSH, Build 2 will be installed at the SFSC. A live test flight will be launched to confirm a successful installation. The installation will be performed by members of the test team, and any noted issues with the documentation (Software Note 10, EHB-9-730, User's Guide, etc...) will be documented in Testtrack Pro as SIRs.

4.3.2 Test Phases

The ST will be conducted in two phases:

- Phase I will be conducted at the WSH OPS24 Test Facility in Silver Spring, Maryland and the SFSC in Sterling, Virginia. This will include the two installations described in Section 4.3.1.

- Phase II will be conducted at the SFSC in Sterling, Virginia.

Phase I is contingent upon successful installations of Build 2 and must be satisfactorily completed prior to moving onto Phase II. All manners of Installation and configuration as well as both phases must be completed prior to completion of the ST.

4.3.2.1 Phase I

Phase I will consist of a test of the two installation types, described in Section 4.3.1:

- Installation on a newly installed system; and
- Installation as an upgrade to Build 1.2.

Each installation type will have two configurations during the ST:

- No NOAAnet connection and without Active Directory configured, this will simulate a remote site; and
- Connected to NOAAnet with Active Directory configured, this will simulate an upper air facility co-located with a WFO.

Phase I will be performed utilizing all members of the test team with the exception of the Field Personnel test team.

4.3.2.2 Phase II

Phase II will consist of the evaluation of the user interface and functionality of Build 2 in an operational-style environment. RRS System 7 will be configured to be connected the NOAAnet with Active Directory setup. This testing will be performed by the entire test team with explicit focus on the Field Personnel portion of the test team evaluating the software during the “free play” portion of the testing.

4.4 System Test Conduct

As described previously, the ST will be conducted in Phases. Phase I will begin following the TRR and commence with testing at WSH. The WSH evaluation will be conducted using pre-recorded upper air flights played through an XDP. This prerecorded data will simulate various upper air meteorological conditions and allow "Check Message" verification. These data sets are from previous upper air flights and used for tests requiring anomalous check messages. For a normal, non-eventful flight, Data Set No. 1007 (recorded on January 17, 2002 at the SFSC) will be used. In addition to utilizing previous flights to simulate a live flight other procedures will be conducted to evaluate the RWS Build 2 performance on such aspects as; Installation, System Administration including the use of Active Directory to control user account authentication, user interfaces, Data Quality and Check Messages, Anomalous Flight Situations, Flight Processing After Termination, Time Changes, and Status Messages. Further Description of the procedures used can be found in Appendix C.

Phase I will also consist of up to three live flights a day which will be conducted at the SFSC using RRS System 7. The live flights will be conducted through a combination of test live flight launches and co-tracking of LWX operational live flights.

The test live flights will be conducted to validate the ST procedures using the RRS System 7. The operational live flights launched by the WFO LWX will be utilized to complete end-to-end communications testing and product analysis.

- No less than 50 successful live flights will be tracked at the SFSC;
    - A successful flight is one which reaches the height of initial coded message generation, 400hPa, and terminates only for non-software related reasons (balloon burst radiosonde failure, etc.)
- All live flights will use the same radiosondes currently being delivered to the operational RRS sites.

The RRS System 7 will track the WFO LWX synoptic soundings and any special flights for which personnel are available. The preflight information will be acquired from the PDB and RSOIS located at WFO LWX. The post release surface observations will be completed from the WFO LWX release point. The flights will be tracked using the operational Build 1.2 system at the WFO LWX to retain the true field use nature of the data stream while the RRS System 7 will track the flights simultaneously utilizing the under test RWS Build 2. The use of dual flight tracking will allow for a greater level of accuracy when comparing the performance of Build 2 to that of Build 1.2. In addition to these flights special test flights, not in conjunction with the WFO LWX, will be conducted for test purposes only.

The standard procedures for LWX flights being tracked by SFSC for the ST are as follows:

- Arrive at the LWX an hour before the expected release time (10 or 22 UTC)

- Briefly describe to the WFO observer that the test team will be tracking their flight and that the test personnel will remain at the WFO during preflight and a portion of the post flight to coordinate launch activities
- Remain at the WFO during preflight and return for a portion of the post-flight activities
- The following activities will be conducted by the test personnel to interface with the test team at the test facility (**NO Impact on WFO**)
    - During preflight, coordinate with the test team in the test facility for the radiosonde frequency and preflight surface observation for entry into the test RWS
    - During release, coordinate with the test team in the test facility when the WFO is preparing to launch.
    - During post flight, coordinate with the test team in the test facility with the post flight surface observation for entry into the test RWS.
- Provide the WFO UA personnel support as needed (i.e. fill a balloon, assist with balloon launch, assist with capturing the flight).

Subsequently, Phase II will begin the same method of live flights from SFSC and co-tracking of flights from LWX; this portion of the test however, will be performed utilizing the field personnel members of the test team (to be selected from various regions. These team members will be using Build 2 to perform various operational style evaluations of the software. These evaluations will include reworking flights previously flown, plotting and analyzing the data streams from the various live test flights tracked and testing other end-user applications of the RWS software such as the plotting and overlay functionalities as well as many of the other new or upgraded aspects of the software.
During the live flight tracking portions of the test is when the test team members from NCEP and NCDC will be used to examine product transmission and the resulting data and formats for use. In order to verify that there is no degradation of capabilities resulting from the NOAAnet and non-NOAAnet configuration the products will be transmitted during both configurations.

During the ST, the test upper air products will be routed to NCEP for content and format evaluation and usability in NCEP's upper air models. Under controlled conditions, NCEP personnel from the Environmental Modeling Center will attempt to open and quality control the RRS data products. NCEP will compare the RRS Build 2 products with official RRS Build 1.2 products from WFO LWX as far as feasible. This will be accomplished by tracking the WFO LWX launches and from the RRS System 7. NCEP will add the ST system WMO identifier to their "THKS" web page (http://www.ncep.noaa.gov/NCO/DMQAB/QAP/thanks/), and display the status of the data along with the data from the WFO LWX. The WMO identifier for the ST system will be removed from the display at the completion of the ST. [Note: To facilitate comparisons, the SFSC will coordinate with the WFO LWX to track their synoptic flights.]

In addition, flight archive information will be forwarded to the NCDC for format evaluation and its usability with NCDC-derived products. The products will be routed over the internet connection. Both NCEP and NCDC will also provide performance data for inclusion in the performance measures.

Coded Messages, Skew-T, and other plot comparisons between Build 1.2 and Build 2 will be performed by members of the product analysis team.

The areas tested will include, but not be limited to:

a. RWS Build 2 Software;

b. TRS Operations (Hardware Status);

c. Conducting live test flights (using test flights at WSH and LWX flights tracked at SFSC);

d. User Interface (GUI) usability;

e. Operational usage of the RRS with Field Personnel "free play";

f. RRS product analysis;

g. Flight Rework;

h. Completing upper air flight documentation [i.e., the current H-6 (rejected radiosonde), B-29 (flight summary), and B-85 (site inventory) forms];

i. Product throughput (i.e., from RWS to LDAD (backup included) through the NWSTG to the NCEP);

j. RRS product format and data evaluation by NCEP;

k. NCDC archive generation and data evaluation by the NCDC; and

l. Data processing (algorithms) analysis (performed by OPS22, OPS23, and OS7).

The ST will be conducted by performing a combination of simulated and live flights with some of the flights chosen for rework.
In addition, the RRS Helpline (301-713-9800) will be utilized during the ST to resolve simulated site problems, and any live flight problems that arise.

Appendix A itemizes the tests that will be performed at WSH during ST to verify the software functional requirements. The ST procedures are categorized by functional area.

Appendix B itemizes the tests that will be performed at the SFSC during ST to verify the software operational capability using live flights.

If any abnormalities (other than those induced for test purposes) or indications of noncompliant operations are observed during the ST, SIRs will be written to document the problem and called to the immediate attention of the RRS ST Director. The ST Director will present the discrepancies to the TRG for classification and recommendation.

4.5 Test Cases

Specific test cases to verify RWS functionality were developed for the test procedures identified in Appendix A and Appendix B. In brief, the areas to be tested (or evaluated) include:

a. RWS System Administration Functions.

b. Evaluation of RWS Functional Capabilities during live and simulated flights, flight rework, data quality control, product throughput, upper air applications, and anomalous flight conditions.

Detailed procedures for each test case utilized in the ST are available upon request from the ST Director.

4.6 Test SIR Reporting and Analysis

The following sections describe how any problems experienced are reported and analyzed.

4.6.1 SIR Reporting

Prior to ST commencement, OPS22 will oversee the conduct of a successful sequence of RRS Benchmark tests and OPS23 must conduct a successful sequence of integration tests with no outstanding Impact 1 or 2 SIRs. In accordance with the schedule contained in Table 3, the ST Director will conduct a Test Readiness Review. During this review, The Build 2 Manager will submit the RRS System Certification Form to OPS24 and will provide the software for the RWS Systems for the ST. The ST Director will provide the RRS Build 2 Manager and the RRS Program Manager with details of what will be tested during the ST, how the ST will be conducted, and how discrepancies will be handled.

System Issue Reports (SIRs) must be completed for each deficiency discovered during the ST. The SIR should include a complete description of the defect including any supporting data. A SIR may also be used to suggest enhancements to the system that are beyond the scope of the ST. TRG meetings are periodically convened during the ST to review and classify SIRs. The ST Director coordinates the collection and dissemination of SIRs to the TRG for adjudication.

4.6.2 SIR Analysis

The TRG will review and investigate each SIR and adjudicate the problem's operational impact and how quickly a fix is needed to minimize a disruption to proceeding with the ST and moving onto the OT&E.

5.0 Post-ST Analysis

The following sections describe how the data collected during the ST will be analyzed, how a recommendation to proceed to the OT&E is determined, and a report written.

5.1 Evaluation of Objectives

This ST is designed to evaluate the performance of Build 2 which is a maintenance revision correcting numerous issues with the currently fielded Build 1.2. The evaluation of this software release is being performed based on the objectives and criteria previously explained in detail in Section 1.3.

5.2 Test Result Analysis

The recommendation to proceed to the OT&E will be based on an analysis of the following criteria:

a. No unresolved Impact 1 or 2 SIRs; and

b. An examination of RWS Build 2 upper air observation products and output for content correctness. This analysis will be performed with support from subject matter experts in OPS22, OPS21, OPS11, OS7, NCEP, and NCDC.

6.0 Test Recommendations and Report

At the conclusion of ST the ST Director will conduct a final "Wrap-up" meeting detailing what was tested, a summary of any discrepancies, major findings, and recommendations. The TRG will review the materials presented by the ST Director. If no Impact 1 or 2 deficiencies have been found, and work-arounds are developed and documented for deficiencies that cannot be fixed until a future build, the TRG will vote to recommend proceeding with OT&E of RWS Build 2.

The decisions of the TRG are based on a majority vote among the voting members. In the event of a tie, the TRG Chair casts the deciding vote. Dissenting opinions will be recorded and reported in the test report. The members of the TRG, including the designated voting members,

are listed in Appendix D. The Test Review Group Chair is a non-voting member of the TRG except in the case of a tied vote.

After the final "Wrap-up" meeting, the ST Director will prepare a formal report of all test activities, including details of any deficiencies. The report will also include findings and recommendations.

Appendix A: WSH Test Procedure Checklist

RRS System Test Build 2 Dryrun Checklist – WSH

Total Number of Procedures: 80

+ **2** Checklists

(User Accounts: A = Administrator; O = Observer; T = Trainee)

TP #	Title	User	Data Set	Est. Time	Comments	POC	QA	Dry-run Date
000 Series – Installation								
001	RRS Installation	A	N/A					
200 Series – System Administration								
211	Flight Management – NCDC Archive Utility	A	N/A	30 min				
212	Flight Management – Flight Import and File Export Utility	O/A	N/A	1 hr				
214	Flight Management – Flight Deletion Utility	A	N/A	1 hr				
215	Flight Management – Flight Summary Utility	O	N/A	1 hr				
222	Application – System Color Setup	A	N/A	1 hr				

TP #	Title	User	Data Set	Est. Time	Comments	POC	QA	Dry-run Date
231	Administration – User Administrative Utility	A	N/A	2 hrs				
234	Administration – Database Backup and Restore Utility	O	N/A	3 hrs				
400 Series –Evaluation of RWS Functional Capabilities								
400a	GUI Verification – Preflight	O		1 - 1.5 hrs				
400b	GUI Verification – In Flight (simulated)	O		1.5 - 2hrs				
400c	GUI Verification – Postflight	O		15-20m				
401a	Nominal Inline Simulator Flight	T	N/A	2hrs				
401b	Nominal Inline Simulator Flight Manual Termination Above 10hPa	T	N/A	2hrs				
401c	Nominal Inline Simulator Flight Manual Termination Between 70hPa and 10hPa	T	N/A	1.5 hrs				
401d	Nominal Inline Simulator Flight Manual Termination Between 400hPa and 70hPa	T	N/A	1.25 hr				

TP #	Title	User	Data Set	Est. Time	Comments	POC	QA	Dry-run Date
401e	Nominal Inline Simulator Flight Manual Termination Between Surface and 400hPa	T	N/A	1 hr				
401f	Editing Check Messages	O	N/A					
402	Nominal Flight – XDP	O	XDP-1007.mal	2 hours				
402a	Nominal Flight – Plots Overlay	O	XDP-1007.mal	1.5 hrs				
402b	Normal Flight – Build 2 Plot functionality	O	XDP-1007.mal	1.5-2hrs				
402c	Workspace _Usage	O, A, T	XDP-1007.mal	1.5-2hrs				
404c	Flight Rework - Imported flight within 6 hours of flight (transmit)	A/O		2hrs				
404d	Flight Rework - Imported flight not within 6 hours of flight	A/O		2hrs				
404e	Flight Rework - Own site with change in local site data	O		2hrs				
405a	Special Flight Release Functions	A/O	N/A					
405b	Special Flight Release Functions	A/O	N/A					

TP #	Title	User	Data Set	Est. Time	Comments	POC	QA	Dry-run Date
405c	Special Flight Release Functions	A/O	N/A					
410 Series – Data Quality and Check Messages								
410	Check Messages Checklist		N/A	NA	INFO ONLY	NA		NA
410a	Wind Speed Exceeds 180kts from minute __ to __ minute.	O	XDP-1039.mal	45 mins		BV	✓	
410b	1. Wind speed change of up to __ knots/min 2. Wind direction change of up to __ degrees/min	A	XDP-1133.mal	1 hr 45 mins		BV	✓	
410c	The difference between the surface and radiosonde pressures at release is _____ hPa.	O	XDP-1572.mal	< 10 mins.		BV	✓	

TP #	Title	User	Data Set	Est. Time	Comments	POC	QA	Dry-run Date
410d	Temperature lapse rate of __ C/km between the levels at __ and __ minutes. A temperature change in levels of up to __ degrees from previous flight at __ hPa. A height change in levels of up to __ meters from previous flight at __ hPa.	O	XDP-proc1c.mal	2 hrs		BV	✓	
410e	No Tropopause above 500mb was found. Ascent rate of __ n/min detected from __ to __ minutes	O	XDP-5007.mal	32 mins		BV	✓	
410i	A level with increasing pressure was deleted at __ minutes	O	XDP-1005.mal			BV	✓	
410j	Editing by user <detail> Exceeds flight termination criteria for missing pressure data. [*Using Processed Tabular Display*]	O	XDP-1096.mal	2 hrs. 20 mins				

TP #	Title	User	Data Set	Est. Time	Comments	POC	QA	Dry-run Date
410k	Editing by user <detail> Exceeds flight termination criteria for missing temperature data. [*Using Processed Tabular Display*]	O	XDP-1096.mal	2 hrs. 20 mins				
410l	Editing by user <detail> Exceeds flight termination criteria for missing pressure data. [*Using Plots*]	O	XDP-1096.mal	2 hrs. 20 mins				
410m	Editing by user <detail> Exceeds flight termination criteria for missing temperature data. [*Using Plots*]	O	XDP-1096.mal	2 hrs. 20 mins				
420 Series – Termination Criteria for excessive missing data.								
420a	4 min no pressure @ Sfc to 10 mins (*cumulative*).	O	XDP-p_4_10.mal	15 mins		BV	✓	
420b	10 min no pressure @ Sfc to 25 mins (*cumulative*)	O	XDP-p_10_25.mal	30 mins		BV	✓	
420c	24 min no pressure @ Sfc to 60 mins (*cumulative*)	O	XDP-p_24_60.mal	1 hr 10 mins		BV	✓	

TP #	Title	User	Data Set	Est. Time	Comments	POC	QA	Dry-run Date
420d	40 mins no pressure for the whole flight (*cumulative*)	O	XDP-p_40.mal	1 hrs 30 mins		BV	✓	
420e	**10 consecutive** mins no pressure	O	XDP-pc_10.mal	15 mins		BV	✓	
420f	4 min no temp @ Sfc to 10 mins (*cumulative*).	O	XDP-t_4_10.mal	10 mins		BV	✓	
420g	6 min no temp @ Sfc to 25 mins (*cumulative*)	O	XDP-t_6_25.mal	35 mins		BV	✓	
420h	12 min no temp @ Sfc to 60 mins (*cumulative*)	O	XDP-t_12_60.mal	1 hr 15 mins		BV	✓	
420i	16 min no temp for the whole flight (*cumulative*)	O	XDP-t_16.mal	2 hrs 10 mins		BV	✓	
420j	**3 consecutive** mins no temp	O	XDP-tc_3.mal	10 mins		BV	✓	
430 Series – RRS Anomalous Flight Situation								
430a	Missing Winds data (Meet with Kevin Kay)	O	XDP-1004.mal	1 hour		BV	✓	
430b	Excessive Missing data	O	XDP-1122.mal	35 mins		BV	✓	
430c	Maximum Winds 132kts data	O	XDP-1006.mal	1 hour		BV	✓	
430d	Maximum Winds 247kts data	O	XDP-1039.mal	1 hour		BV	✓	

TP #	Title	User	Data Set	Est. Time	Comments	POC	QA	Dry-run Date
430e	Rapid RH changes and Multiple Temperature Lapse Rates	O	XDP-1118.mal	1 hour		BV	✓	
430f	Temperature less than -80C Degree	O	XDP-1095.mal	2 hours 15 mins		BV	✓	
430g	Less Than 250 m/min Ascension Rate	O	XDP-1096.mal	2 hours 15 mins		BV	✓	
430h	Floating Balloon	O	XDP-1319.mal	1 hour 35 mins		BV	✓	
430i	Constant Pressure at 200 hPa	O	XDP-4001.mal	40 mins		BV	✓	
430j	Constant Pressure at 600 hPa	O	4004.mal	30 mins		BV	✓	
430k	Excessive Missing Pressure Data	O	XDP-1148.mal	15 mins		BV	✓	
430l	Balloon Burst	O	SIR2054.mal	2 hours		BV	✓	
430m	Temperature Inversion Off Surface	O	XDP-1613.mal	1 hour		BV	✓	
430o	Failed Temperature Sensor	O	XDP-5001.mal	30 mins		BV	✓	
430p	Out of Range Temperature Spikes	O	5004.mal	30 mins		BV	✓	
430q	Within Range Temperature and Pressure Spikes	O	AllSpikes.mal	40 mins		BV	✓	

TP #	Title	User	Data Set	Est. Time	Comments	POC	QA	Dry-run Date
430r	Seven Freezing Levels	O	XDP-1655.mal	15 mins		BV	✓	
430s	Negative Pressure Levels	O	4005.mal	20 mins		BV	✓	
430t	Out of Range Pressure Spikes	O	4006.mal	20 mins		BV	✓	
440 series – RRS Extreme Site Locations								
440a	Key West (KHQR), FL	A	1240m.s03	1 hr 45 mins		BV	✓	
440b	Riverton (KHQV), WY	A	1239m.s03	1 hr 45 mins		BV	✓	
440c	Flagstaff (KHQP), AZ	A	1181m.s03	1 hr 45 mins		BV	✓	
440d	Kodiak (KHQS), AK	A	1178m.s03	2 hrs 25 mins		BV	✓	
440e	Hilo (KHQQ), HI	A	1237m.s03	1 hr 45 mins		BV	✓	
440f	Pago Pago (KHQT)	A	1226m.s03	2 hrs		BV	✓	
440g	Yap, WCI (KHQV)	A	1241m.s03	1 hr 45 mins		BV	✓	
440h	Barrow (KHQN), AK	A	1182m.s03	2 hrs 25 mins		BV	✓	
Miscellaneous Tests								

TP #	Title	User	Data Set	Est. Time	Comments	POC	QA	Dry-run Date
502	Disk Storage Warning	A/O		1 hour				
508	Section 508 Compliance	N/A	N/A	2 ½ hrs				
509c	Miscellaneous Stress Activities (XDP Flight)	O	XDP-1319.mal	2 hrs				
510	Security Policy Compliance	N/A	N/A					
703	Status Messages Checklist	O	N/A					
706	Pop-Up Messages Checklist	O	N/A					
Tests Require Time Change								
801	Comparison Flight Test	O	N/A					

Appendix B: SFSC Test Procedure Checklist

RRS System Test Build 2 Dryrun Checklist – SFSC

Total Number of Procedures: **23**
+ **2** Checklists
+ Other flights (LWX/SFSC)
(Note: User Accounts: A - Site Administrator; O - Observer; T - Trainee)

TP#	Test Title/Scenario	User Acct	Est Time	Comments	SONDE	POC	Date
Installation and Hardware							
001	RRS Installation	A	3 Hrs	Ghosting CD/Mod notes required for this test.			
002	TRS/CDU Remote Operations	A	2 Hrs	Hardware only.			
003	SPS Communication Status	A	2 Hrs	Hardware only.			
004	Offline Utility Suite validation	A	3 Hrs	– OBIT – can use simulated radiosonde –			
501B	System Failure/Recovery	O	2 Hrs	- Hardware, Radiosonde	Plug-in		
Live Flight							
403	Normal Live Flight	O	2-2.5 hrs	Radiosonde (can piggyback)	Live		
403A	Live Flight – Term 10 – 0 hPa	O	2-2.5 hrs	Radiosonde (can piggyback) 1st complete 403F then prior to a launch to simulate a 2nd ascension of the same release.	Live		
403B	Live Flight – Term 70 – 10 hPa	O	2 hrs	Radiosonde (can piggyback)	Live		
403C	Live Flight – Term 400 – 70 hPa	O	1.5 hrs	Radiosonde (can piggyback)	Live		

TP#	Test Title/Scenario	User Acct	Est Time	Comments	SONDE	POC	Date
403D	Live Flight – Term Sfc – 400 hPa	O	1-1.5 hrs	Radiosonde (can piggyback)	Live		
403E	Antenna Search Mode Test	O	10min / instance	Radiosonde (can piggyback)	Live		
403F	Manual Release Detection	O	15 – 20m	Radiosonde (can piggyback); **To be run prior to 403A**	Plug-in		
402A	Plots - Overlay	O		Can be run during Free Play portion of a 403 series flight			
402B	Normal Flight – Build 2 Plot functionality	O		Can be run during Free Play portion of a 403 series flight			
Flight Rework							
413A	AWIPS Transmit Setup	O					
413B	AWIPS Transmit in Flight	O		Real flight; check skew-t on AWIPS and RRS for edits	Live		
404A	– Reworking a local flight - Within 6 hours of selected flight	O					
404B	– Reworking a local flight - Not within 6 hours of flight	O					
Flight Management and Administration							
211	NCDC Archive Utility	A					
212	Flight Import and Export Utility	A					

TP#	Test Title/Scenario	User Acct	Est Time	Comments	SONDE	POC	Date
215	Flight Summary Utility	A					
234	Database Backup and Restore Utility	A					
Flight Stress and Recovery							
509a	Stress during in-flight operations	O					
509b	Stress during in-flight recovery	O					
Miscellaneous Tests (annotated as needed)							
703	Status Message Checklist	NA		A collection of status messages seen while performing combinations of 403 as well as seen at WSH			
706	Pop-Up Message Checklist	NA		A collection of status messages seen while performing combinations of 403 as well as seen at WSH			
Live Flight Tests (annotated as needed)							
	Various combinations of 403 under different weather conditions			Radiosonde required	Live		
	Tracking LWX live flights				LWX		

Appendix C: RRS Test Procedure Descriptions

Test Number	Title	Purpose
000 Series – Installation/hardware checkout		
001	RRS Installation	Conduct software installations.
002	TRS/CDU Remote Operations	Check out TRS/CDU remote operations • Provides additional status information (English explanation versus only the code or bit values) • TRS Status Display: o Clicking with the mouse on the Azimuth/Elevation dial of the TRS status display results in the antenna moving to that position. o TRS tracking errors were added to the TRS display. o Signal strength units changed to match CDU (0 to -132 dBm)
003	SPS Communication Status	Check out SPS communication
200 Series - System Administration		
201	Tools File and Directory	Verifies the ability of offline utilities to create and remove various levels of user accounts; save and print files; and manipulate files.
211	Flight Management - NCDC Archive Utility	Verifies the ability of using the offline Archive Utility to prepare the flight archive to NCDC. Archive now automatically transmits files to NCDC
212	Flight Management - Flight Import and Export Utility	Exercises the ability to import and export flight data from and to other RRS'.
214	Flight Management - Flight Deletion Utility	Exercises the ability for Site Managers and Administrators to delete selected flight data.
215	Flight Management - Flight Summary Utility	Exercises the ability to delete view and edit flight summary data.
220	Application Utility	Exercises the ability to change system configurations.
221	Application – System Color Setup	Exercises the ability to update System color setup

Test Number	Title	Purpose
231	Administration - User Administrative Utility	Exercises the Site Manager and System Administrator capabilities of adding, modifying, and deleting user accounts. Implements domain accounts and use of Active Directory to control user authentication and enforce a nationally standardized security configuration.
234	Administration - Database Backup and Restore Utility	Verifies the ability to create database backups and to restore the database from backups.
400 Series -Evaluation of RWS Functional Capabilities		

Test Number	Title	Purpose
400	Inline Simulator GUI Checkout	Exercises the RWS Graphical User Interface (GUI) options available when running a simulated flight. • Preflight / baseline windows now use standard windows components versus being in a grid format. • Limit of surface relative humidity entry by observer lowered from 5% to 0.5%. • Flight startup assortment of windows has been reorganized and resized to all viewing of each without any overlaps. • Flight Processed Data tool bar shows TRS and SPS status in flight modes, including status of incoming SPS winds (to clarify cases where GPS satellite receipt appears satisfactory, but SPS is rejecting winds). The release number for the flight was also added. • Coded product selection and transmission features have been streamlined for simpler operation and adherence to windows standards. • Tabular grids, plots, and message lists provide consistent print functionality options through the context menu (right-click). This includes the Print, Page Setup, and Print Preview functions. Warning provided if printed page count is expected to be over 10 pages. • Quality indicator values have been eliminated from the Processed Data grid. • Hardware status has condensed display capability utilizing less screen space, while displaying a summary of entire system status (tabbed view). • Windows previously opened and closed during a work session (flight) will reappear in their last position when reopened. • General reduction in number of routine popup message boxes by combining into a single termination dialog window, and elimination of status alerts not intended to force specific observer actions or confirmation. • Station data display value formats have been set to eliminate floating point values showing many decimal places. • Audible alert turned on when release is detected. • Audible alert and popup message generated when GPS data has been lost for 2 minutes. • Audible alert and popup message is generated when temperature and pressure data are missing for more than 1 minute and again (if previously cleared) at 2 minutes. Flight terminates at 3 minutes.
401	Nominal Inline Simulator Flight	Includes radiosonde activation, pre-flight, radiosonde baseline, synoptic flights, and launch sequence while utilizing the RWS Inline Simulator capability.

Test Number	Title	Purpose
402	Nominal Flight - XDP	Using an external data pump (XDP) to simulate RRS subsystem input, this procedure verifies the ability to run an uneventful, live flight. • User-definable workspaces now include all window types and also include the column configuration in the processed data grid • The Flight Summary now contains additional parameters such as release time, freezing level crossings, -20C height, geopotential height for the maximum wind and tropopause level details • Help function added (online version of user's manual). • Initiation of edit mode in the processed data grid is now by explicit command (context menu item). • PDB pressure will no longer be editable on the baseline form. If more than 2 minutes elapses between acceptance of surface data to calculation of radiosonde pressure correction, the PDB pressure is automatically updated to the current value, or the operator is alerted to check a manually entered station pressure (when Calculate button is pressed).
402a	Plots -Overlays	Exercises the various plot capabilities as well as the ability to overlay a plot from a pervious flight.
402b	Build 2 New Plot Functionality	• User configurable plots (parameters, colors, line thickness, scales) • Shared (all users of system) and Private (individual) Plot configurations in addition to the predefined plot set • Graphical editing of processed data • Skewing of temperature supported • Log P supported as vertical axis (time and geopotential height are the other options for vertical axes) • Trajectory plots have 3-D viewing function • Winds appear as shaft/barb display in an optional wind column • Save as graphic image file • Update dynamically during live flights
403	Nominal Flight - Live	The RRS is exercised utilizing a live flight totally dependent on current environmental conditions.
403A	Search Mode	Exercises the various search mode options.
404	Flight Rework Capability	Verifies the ability to perform flight rework functions on a previous upper air flight--both a recent flight and an imported flight from another RRS.

Test Number	Title	Purpose
410	Data Quality Control Checks	Verifies the operator's ability to perform quality control checks of the flight data prior to product transmission. • Check message generated when amount of data marked by observer as rejected exceeds normal criteria for flight termination • The "no level was selected with 20hPa of the surface" message has been eliminated (level no longer generated). • Various message rewording to clarify intent of message.
411	RWS In-flight Operations	Exercises those options available to the operator while a flight is in progress. This includes opening multiple plots, all tabular displays, performing overlays, and general system stress.
413	Product Throughput	Demonstrates rudimentary end-to-end transmission of products from the RWS to the LDAD database. Products will also be sent to NCEP for evaluation. LAN status changes reported as they occur, not just when starting RWS Leading zeroes for IP addresses are now displayed when configuring communications parameters
420	UA Applications Verification	Verifies usability of RRS data by AWIPS applications such as the Skew-T, Log P display and site specific applications or other special purpose applications.
430	Anomalous Flight Situations	Exercises the RWS capability to handle anomalous flight/environmental conditions by using the XDP running special data sets.
440	Extreme Flight Locations	Exercises the RWS capability to handle flights from extreme site locations that are geographically unique by using the XDP running special data sets.
700 Series - RRS Reliability, Maintainability, and Availability		
702	Flight Data Collection	This is not a test procedure as such, but a means of documenting the algorithm and performance data collection methodology for each RRS flight (both simulated using the External Data Pump (XDP) and Live) for subsequent analysis. The data collected will be assembled into a "folder" to facilitate data quality and algorithm analysis by OPS22 and OS7. Specific directions for running an XDP flight may be found in Test Procedure 402; Test Procedure 403 contains directions for running a live flight.

Test Number	Title	Purpose
Miscellaneous		
508	Section 508 compliant	Supports keyboard-only operation, provides special Section 508 mode on a per user basis to display additional symbols in tables to supplement color coding.
509	Stress & Recovery Test	• Evaluate RWS Software performance during periods of increased CPU activity (ex. numerous windows open and applications running in the background). • Evaluate RWS software ability to recover/performance after catastrophic events.
703	Status message checklist	• A status message will be generated if the pressure was manually overridden by the observer ["Surface pressure manually changed from xxxx.xx hPa to xxxx.xx hPa."] • Recognizes when large jump in radiosonde position occurs, resulting from switch to another site's radiosonde. • Records TRS resets by user • Issue of observer's post-flight status message comments becoming jumbled when the flight is reworked has been fixed. • A status message will indicate how release was determined (auto-detect or manually by observer).
800	Miscellaneous Software Management	Miscellaneous software requirements that do not fit into an Administrative, Maintenance, or Operational category.

Appendix D: Test Review Group (TRG) Personnel

Name/Organization	Function	Phone	Voting Member
Jae Lee (OPS24)	Test Review Group Chair	301-713-0326 x158	N
Aaron Poyer (OPS24)	System Test Test Director	301-713-0326 x112	**Y**
Joseph Facundo (OPS22)	RWS Build 2 Manager	301-713-2093 x101	N
Dom Bosco (OPS11)	RRS Program Manager	301-713-1841 x123	**Y**
William Blackmore (OPS22)	Upper Air Technical Support	301-713-2093 x107	**Y**
Rich Thomas (OPS23)	Software Branch Chief	301-713-0191 x108	**Y**
Sergio Marsh (OS7)	Upper Air Technical Support	301-713-1792 x124	**Y**
Kevin Murray (ER42)	Eastern Region Upper Air Program Manager	631-244-0146	**Y***
Mike Asmus (SR4)	Southern Region Upper Air Program Manager	817-978-7777 x133	**Y***
Bob Bonack (CR1)	Central Region Upper Air Program Manager	816-268-3148	**Y***
Harold Knocke (WR421)	Western Region Upper Air Program Manager	801-524-5138 x276	**Y***
Larry Hubble (AR42)	Alaska Region Upper Air Program Manager	907-271-5135	**Y***
Derek Leeloy (PR1)	Pacific Region Upper Air Program Manager	808-532-6439	**Y***
Bradley Ballish (NP12)	NCEP Upper Air Technical Focal Point	301-763-8000 x7159	**Y**
Stuart Hinson (E/CC21)	NCDC Upper Air Technical Focal Point	828-271-4437	**Y**

* Field support personnel could have a vote if their Regional Focal Point is not available during the TRG conference call.

Appendix E: RRS RWS Build 2.0 Software Changes

Summary of RWS Build 2 Software Changes

- Sustainability improvement. Migrated most of the program to the C# language, and it now uses the Microsoft .NET 3.5 Framework. This improves software compatibility with future versions of the Windows operating system, and also gives a Windows XP look and feel to the user interface. A new, more efficient third-party grid library (Syncfusion) is now being used.

- The Microsoft Jet database engine (Access format) was replaced by Microsoft SQL Server Express 2008, providing more robust database functionality. This should result in successful data recovery following catastrophic events such as power failures. Older database formats are automatically upgraded when imported into RWS.

- **New Plot Functionality:**
  - User configurable plots (parameters, colors, line thickness, scales)
  - Shared (all users of system) and Private (individual) Plot configurations in addition to the predefined plot set
  - Graphical editing of processed data (marking data and applying user edits, which are then reflected in the processed tabular data and coded messages)
  - Skewing of temperature supported
  - Log P supported as vertical axis (time and geopotential height are the other options for vertical axes)
  - Trajectory plots have 3-D viewing function
  - Winds appear as shaft/barb display in an optional wind column
  - Save as graphic image file
  - Update dynamically during live flights

- Implements domain accounts and use of Active Directory to control user authentication and enforce a nationally standardized security configuration.

- Archive Utility now automatically transmits files to NCDC.

- RWS is ready to support transmission of high resolution data sets (BUFR format).

- Supports new radiosonde and SPS types.

- User-definable workspaces now include all window types and also include the column configuration in the processed data grid.

- The Flight Summary now contains additional parameters such as release time, freezing level crossings, -20C height, geopotential height for the maximum wind and tropopause level details.

- Help function added (online version of user's manual).

- **Hardware status reporting improvements:**
  - Provides additional status information (English explanation versus only the code or bit values)
  - LAN status changes reported as they occur, not just when starting RWS

- **Section 508 compliance changes:**
  - Supports keyboard-only operation, provides special Section 508 mode on a per user basis to display additional symbols in tables to supplement color coding.

- **User Interface Changes:**
  - Preflight / baseline windows now use standard windows components versus being in a grid format.
  - Limit of surface relative humidity entry by observer lowered from 5% to 0.5%.
  - Flight startup assortment of windows has been reorganized and resized to all viewing of each without any overlaps.
  - Flight Processed Data tool bar shows TRS and SPS status in flight modes, including status of incoming SPS winds (to clarify cases where GPS satellite receipt appears satisfactory, but SPS is rejecting winds). The release number for the flight was also added.
  - Coded product selection and transmission features have been streamlined for simpler operation and adherence to windows standards.
  - Tabular grids, plots, and message lists provide consistent print functionality options through the context menu (right-click). This includes the Print, Page Setup, and Print Preview functions. Warning provided if printed page count is expected to be over 10 pages.
  - Quality indicator values have been eliminated from the Processed Data grid.
  - Hardware status has condensed display capability utilizing less screen space, while displaying a summary of entire system status (tabbed view).
  - Windows previously opened and closed during a work session (flight) will reappear in their last position when reopened.
  - General reduction in number of routine popup message boxes by combining into a single termination dialog window, and elimination of status alerts not intended to force specific observer actions or confirmation.
  - Station data display value formats have been set to eliminate floating point values showing many decimal places.
  - TRS Status Display:
    - Clicking with the mouse on the Azimuth/Elevation dial of the TRS status display results in the antenna moving to that position.
    - TRS tracking errors were added to the TRS display.
    - Signal strength units changed to match CDU (0 to -132 dBm)
  - Audible alert turned on when release is detected.
  - Audible alert and popup message generated when GPS data has been lost for 2 minutes.

- Audible alert and popup message is generated when temperature and pressure data are missing for more than 1 minute and again (if previously cleared) at 2 minutes. Flight terminates at 3 minutes.

- **Data Processing Changes:**
  - Pressure outlier routine will only resume acceptance of pressure data (following 3 bad pressures) when a pair of incoming points are within tolerance of each other (i.e., missing data points result in continued rejection of data).
  - Unsmoothed winds and position from SPS now used, and smoothed in RWS. First few seconds of winds off surface are excluded (currently 5 seconds), and replaced by interpolated values based on the surface wind observation.
  - Flight termination processing will continue to collect wind data until any lagging wind data is received up through the termination pressure level.
  - Relative humidity is now smoothed using a 9 second average.
  - Temperature, pressure and wind values at release and termination are properly limited such that values outside the actual flight range are not included in the smoothing of the data (averaging).
  - Isolated values of temperature surrounded by missing data are now used in RWS interpolations and smoothing (subject to 60 second missing data limit).
  - Data in descending / re-ascending layers is not used in levels generation regardless of the depth of the layer (had allowed such when layer was less than 30 seconds of data).
  - No extra level is added to the levels table at 20hPa to ensure a level exists between surface and 20hPa above surface.
  - Miscellaneous minor WMO message coding issues were fixed.
  - Miscellaneous NCDC archive issues were fixed, such as the wind heights occasionally being recorded out of sequence.

- **Status message changes:**
  - A status message will be generated if the pressure was manually overridden by the observer ["Surface pressure manually changed from xxxx.xx hPa to xxxx.xx hPa."]
  - Recognizes when large jump in radiosonde position occurs, resulting from switch to another site's radiosonde.
  - Records TRS resets by user
  - Issue of observer's post-flight status message comments becoming jumbled when the flight is reworked has been fixed.
  - A status message will indicate how release was determined (auto-detect or manually by observer).
  - Various message rewording to clarify event descriptions and actions required.

- **Check message changes:**
  - Check message generated when amount of data marked by observer as rejected exceeds normal criteria for flight termination
  - The "no level was selected with 20hPa of the surface" message has been eliminated (level no longer generated).

- Various message rewording to clarify intent of message.

- **Other Changes:**
  - Initiation of edit mode in the processed data grid is now by explicit command (context menu item).
  - PDB pressure will no longer be editable on the baseline form. If more than 2 minutes elapses between acceptance of surface data to calculation of radiosonde pressure correction, the PDB pressure is automatically updated to the current value, or the operator is alerted to check a manually entered station pressure (when Calculate button is pressed).

Appendix F: RRS System Certification Form

The purpose of this checklist is to document that the various hardware subsystems and software are functioning, and all required documentation is available to support the System Test. The items below are required to be completed by the Test Readiness Review. Entries should be made below to identify hardware serial number(s), firmware versions, Version Description Documents (VDD), test procedures, etc. required to identify the equipment configuration to be tested. Contract Officer's Representatives (COR) and their Branch Chiefs need to certify that the subsystems have been checked out and ready for ST. The RWS Build 2 Manager will certify that the System is ready to be turned over to the System Test Director.

1. Hardware:

1.1 TRS (System 7)
Hardware: (Serial No.) _____ Firmware: (Version No.) _____
Checkout Procedure: (Attached?) (Y/N) _____ Date: _____

1.2 SPS (System 7)
Hardware: (Serial No.) _____ Firmware: (Version No.) _____
Checkout Procedure: (Attached?) (Y/N) _____ Date: _____

1.3 GPS Repeater (Location)
Hardware: (Serial No.) _____
Checkout Procedure: (Attached?) (Y/N) _____ Date: _____

1.4 SPS Base Antenna (System 7)
Hardware: (Serial No.) _____
Checkout Procedure: (Attached?) (Y/N) _____ Date: _____

1.5 RSOIS (System 7)
Hardware: (Serial No.) _____
Checkout Procedure: (Attached?) (Y/N) _____ Date: _____

1.6 Workstations:

1.6.1 Workstation (System 7)
Hardware: (Serial No.) _____
Checkout Procedure: (Attached?) (Y/N) _____ Date: _____

1.6.2 Workstation (System WSH ITB Rm 6240)
Hardware: (Serial No.) _____
Checkout Procedure: (Attached?) (Y/N) _____ Date: _____

1.6.3 Workstation (System WSH Rm 4402)
Hardware: (Serial No.) _____
Checkout Procedure: (Attached?) (Y/N) _____ Date: _____

1.7 Radiosondes
Number of Sondes Available: _____

1.8 PDB (System 7)

Hardware: (Serial No.) _____

Checkout Procedure: (Attached?) (Y/N) _____ Date: _____

Dominic Bosco (Signature) _____ Date: _____

1.9 NOAAnet/Active Directory Configuration (System 7)

Connected/Configured: (Y/N) ____ Date: _____

Operational: (Y/N) _____ Date: _____

James Fitzgibbon (Signature) _____ Date: _____

1.10 NOAAnet/Active Directory Configuration (System 6240)

Connected/Configured: (Y/N) ____ Date: _____

Operational: (Y/N) _____ Date: _____

Claudina Castro (Signature) _____ Date: _____

2. Software:

2.1 RRS Workstation Software:

RWS Application SW: (Version No.) _____

All Deliverable Media (e.g., Ghosting CDs) (Attached?) (Y/N) ___ Date: ____

Richard Thomas (Signature) _____ Date: _____

2.2 RWS Security Vulnerability Scan:

James McNitt (Signature) _____ Date: _____

2.3 RWS Benchmark Testing:

Carl Bower (Signature) _____ Date: _____

3. Documentation:

3.1 RWS Build 2.0 Request for Change:

Manual: (Attached?) (Y/N) ___

Web Address: _____ Date: _____

James McNitt (Signature) _____ Date: _____

3.2 RWS Version Description Document:

Manual: (Attached?) (Y/N) ___

Web Address: _____ Date: _____

Claudina Castro (Signature) _____ Date: _____

3.3 RRS Software Note 10:

Manual: (Attached?) (Y/N) ___

Web Address: _____ Date: _____

Kenneth Clark (Signature) _____ Date: _____

3.4 RWS User's Guide (updates):

Manual: (Attached?) (Y/N) ___

Web Address: _____ Date: _____

Dominic Bosco (Signature) _____ Date: _____

3.7 EHB-9-730-S2, RRS System Administration Manual (updates):

Manual: (Attached?) (Y/N) ___

Web Address: _____ Date: _____

Kenneth Clark (Signature) _____ Date: _____

4. RWS Build 2:

All Systems and required support documents installed, Certified, and ready for ST:

RWS Build 2 Manager (OPS22)

Joseph Facundo (Signature) _____ Date: _____

Appendix G: SFSC RRS System 7 Station Data

Due to the use of the SFSC RRS System 7 as both a stand alone system and as a co-tracking system for the WFO LWX flights during ST it will be necessary to alter the station data dependent upon the facility performing the launch (SFSC or LWX). The two tables that follow show the Master station and Local station data that will be used.

SFSC RRS System 7 Station Data for all test flights

MASTER STATION DATA:	
STATION NAME	SterlingLive-TRS7
WMO NUMBER (test)	69990
WMO REGION	4
STATION ID	KSTA
WBAN	93734
RESPONSIBLE WFO ID	KSTA
AWIPS XXX (FAA) ID	STA
STATION LATITUDE (dd:mm:ss)	38:58:22
STATION LONGITUDE (dd:mm:ss)	-77:29:18
STATION ELEVATION (m MSL)	88.422
BASE PRESSURE (hPa)	850
RELEASE POINT LATITUDE (dd:mm:ss)	38:58:24
RELEASE POINT LONGITUDE (dd:mm:ss)	-77:29:17
RELEASE POINT ELEVATION (m MSL)	88.103
LAST UPDATED	04/22/2009 16:43:56
LOCAL STATION DATA:	
RELEASE POINT PRESSURE CORRECTION (hPa) [derived]	0.00
TARGET ANTENNA AZIMUTH ANGLE (Deg)	0.00
TARGET ANTENNA ELEVATION ANGLE (Deg)	0.00
SPS GPS ANTENNA ELEVATION (m WGS84)	56.257
SPS GPS ANTENNA ELEVATION (m MSL)	89.513
SPS GPS ANTENNA (N+/S- dd:mm:ss.fffff)	38:58:23.73050
SPS GPS ANTENNA (E+/W- dd:mm:ss.fffff)	-77:29:03.46981
TRS ELEVATION (m MSL)	87.443
TRS LATITUDE (N+/S- dd:mm:ss.fffff)	38:58:23.7
TRS LONGITUDE (E+/W- dd:mm:ss.fffff)	-77:29:03.5
ORIENTATION CORRECTION AZIMUTH ANGLE (Deg)	0.00
ORIENTATION CORRECTION ELEVATION ANGLE (Deg)	0.00
SURFACE OBSERVATION (Obs.) EQUIPMENT	RSOIS
SURFACE Obs. DISTANCE FROM RELEASE POINT (m)	29.541
SURFACE Obs. HEIGHT FROM RELEASE POINT (m MSL)	88.864
SURFACE Obs. BEARING FROM RELEASE POINT (Deg)	216.00
RADIOSONDE TYPE	Sippican Mark IIa GPS
GROUND RECEIVING SYSTEM	IMS-2000 (TRS)

RADIOSONDE TRACKING METHOD	GPS
BAROMETER HEIGHT (m MSL)	88.422
BALLOON SHELTER TYPE	High Bay
BALLOON GAS	Hydrogen
OPERATIONAL FREQUENCY (MHz)	1680.00
ROOFTOP RELEASE	No
WMO HEADER (FZL)	UXUS97
WMO HEADER (MAN)	USUS97
WMO HEADER (SGL)	UMUS97
WMO HEADER (ABV)	UFUS97
WMO HEADER (ULG)	NXUS97
WMO HEADER (DD1)	IUDD01
WMO HEADER (DD2)	IUDD02
LAST UPDATED	05/06/2009 10:27:00

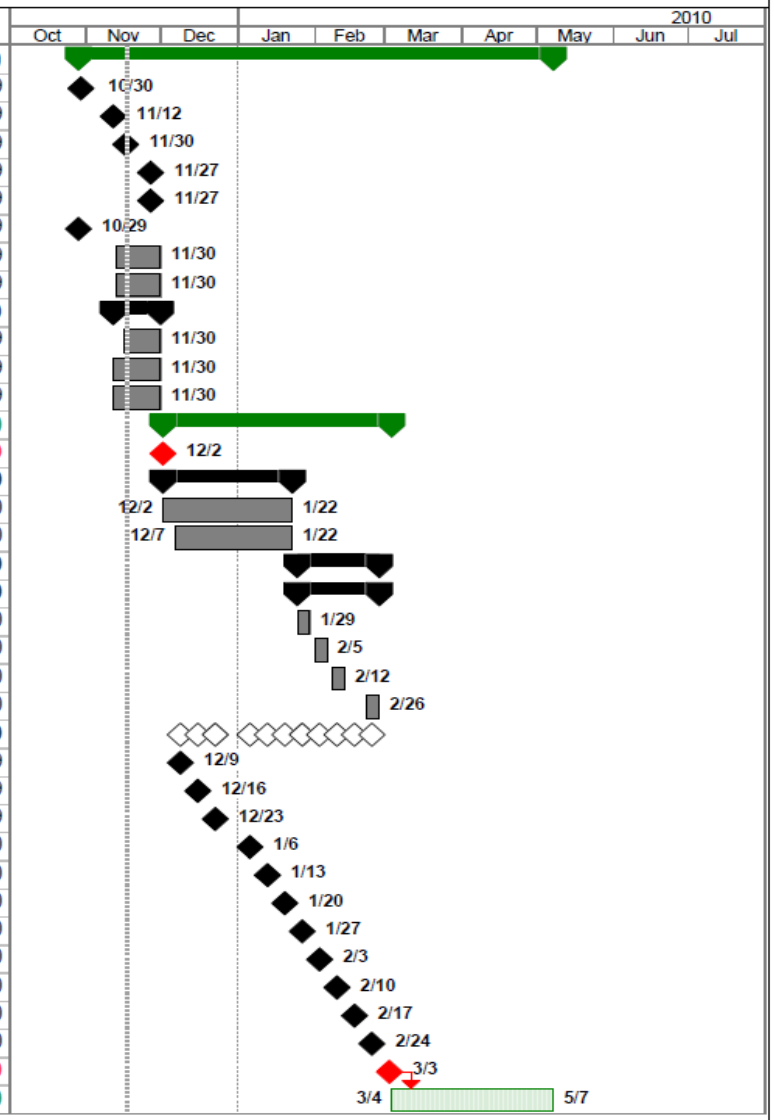
SFSC RRS System 7 for co-tracking LWX flights

MASTER STATION DATA:	
STATION NAME	SterlingLive-TRS7
WMO NUMBER (test)	69990
WMO REGION	4
STATION ID	KSTA
WBAN	93734
RESPONSIBLE WFO ID	KSTA
AWIPS XXX (FAA) ID	STA
STATION LATITUDE (dd:mm:ss)	38:58:36.30106**
STATION LONGITUDE (dd:mm:ss)	-77:29:11.32822**
STATION ELEVATION (m MSL)	88.554
BASE PRESSURE (hPa)	850
RELEASE POINT LATITUDE (dd:mm:ss)	38:58:35.88083**
RELEASE POINT LONGITUDE (dd:mm:ss)	-77:29:09.43250**
RELEASE POINT ELEVATION (m MSL)	88.435**
LAST UPDATED	04/22/2009 16:43:56
LOCAL STATION DATA:	
RELEASE POINT PRESSURE CORRECTION (hPa) [derived]	0.00
TARGET ANTENNA AZIMUTH ANGLE (Deg)	0.00
TARGET ANTENNA ELEVATION ANGLE (Deg)	0.00
SPS GPS ANTENNA ELEVATION (m WGS84)	56.257
SPS GPS ANTENNA ELEVATION (m MSL)	89.513
SPS GPS ANTENNA (N+/S- dd:mm:ss.fffff)	38:58:23.73050
SPS GPS ANTENNA (E+/W- dd:mm:ss.fffff)	-77:29:03.46981
TRS ELEVATION (m MSL)	87.443
TRS LATITUDE (N+/S- dd:mm:ss.fffff)	38:58:23.7
TRS LONGITUDE (E+/W- dd:mm:ss.fffff)	-77:29:03.5
ORIENTATION CORRECTION AZIMUTH ANGLE (Deg)	0.00
ORIENTATION CORRECTION ELEVATION ANGLE (Deg)	0.00
SURFACE OBSERVATION (Obs.) EQUIPMENT	RSOIS
SURFACE Obs. DISTANCE FROM RELEASE POINT (m)	320**

SURFACE Obs. HEIGHT FROM RELEASE POINT (m MSL)	89.240**
SURFACE Obs. BEARING FROM RELEASE POINT (Deg)	320**
RADIOSONDE TYPE	Sippican Mark IIa GPS
GROUND RECEIVING SYSTEM	IMS-2000 (TRS)
RADIOSONDE TRACKING METHOD	GPS
BAROMETER HEIGHT (m MSL)	88.544**
BALLOON SHELTER TYPE	High Bay
BALLOON GAS	Helium
OPERATIONAL FREQUENCY (MHz)	1680.00
ROOFTOP RELEASE	No
WMO HEADER (FZL)	UXUS97
WMO HEADER (MAN)	USUS97
WMO HEADER (SGL)	UMUS97
WMO HEADER (ABV)	UFUS97
WMO HEADER (ULG)	NXUS97
WMO HEADER (DD1)	IUDD01
WMO HEADER (DD2)	IUDD02
LAST UPDATED	05/06/2009 10:27:00

**** Modified values for tracking WFO LWX flights using SFSC RRS System TRS 7 (coordinated with OPS11 and OPS23)**

Appendix H: Complete Test Schedule

RWS Build 2 Schedule (Nov 12, 2009)

ID	Task Name	Start	Finish
1	**RWS Build 2 ST**	**Thu 10/29/09**	**Fri 5/7/10**
2	Generate Build 2 RC	Fri 10/30/09	Fri 10/30/09
3	TIN Transmission	Thu 11/12/09	Fri 11/13/09
4	Distribute Final ST plan for signature	Tue 11/17/09	Mon 11/30/09
5	Active Directory setup at WSH	Fri 11/27/09	Fri 11/27/09
6	Active Directory setup at SFSC	Fri 11/27/09	Fri 11/27/09
7	Security vulnerability Scan	Thu 10/29/09	Thu 10/29/09
8	Final dryrun of ST Procedures	Fri 11/13/09	Mon 11/30/09
9	NCEP/NCDC/TG/AWIPS/Field Coordination	Fri 11/13/09	Mon 11/30/09
10	**System Integration Tests**	**Thu 11/12/09**	**Mon 11/30/09**
11	Validation tests	Mon 11/16/09	Mon 11/30/09
12	Benchmark tests	Thu 11/12/09	Mon 11/30/09
13	Live flights	Thu 11/12/09	Mon 11/30/09
14	**ST Conduct**	**Wed 12/2/09**	**Wed 3/3/10**
15	**ST Readiness Review Meeting**	**Wed 12/2/09**	**Wed 12/2/09**
16	**Phase I ST (WSH/SFSC)**	**Wed 12/2/09**	**Fri 1/22/10**
17	ST at WSH and SFSC	Wed 12/2/09	Fri 1/22/10
18	Track LWX flights	Mon 12/7/09	Fri 1/22/10
19	**Phase II ST (SFSC)**	**Mon 1/25/10**	**Fri 2/26/10**
20	**Evaluation by Field personnel**	**Mon 1/25/10**	**Fri 2/26/10**
21	Field Personnel Week 1	Mon 1/25/10	Fri 1/29/10
22	Field Personnel Week 2	Mon 2/1/10	Fri 2/5/10
23	Field Personnel Week 3	Mon 2/8/10	Fri 2/12/10
24	Field Personnel Week 4	Mon 2/22/10	Fri 2/26/10
25	**ST TRG Meeting**	**Wed 12/9/09**	**Wed 2/24/10**
26	ST TRG Meeting 1	Wed 12/9/09	Wed 12/9/09
27	ST TRG Meeting 2	Wed 12/16/09	Wed 12/16/09
28	ST TRG Meeting 3	Wed 12/23/09	Wed 12/23/09
29	ST TRG Meeting 5	Wed 1/6/10	Wed 1/6/10
30	ST TRG Meeting 6	Wed 1/13/10	Wed 1/13/10
31	ST TRG Meeting 7	Wed 1/20/10	Wed 1/20/10
32	ST TRG Meeting 8	Wed 1/27/10	Wed 1/27/10
33	ST TRG Meeting 9	Wed 2/3/10	Wed 2/3/10
34	ST TRG Meeting 10	Wed 2/10/10	Wed 2/10/10
35	ST TRG Meeting 11	Wed 2/17/10	Wed 2/17/10
36	ST TRG Meeting 12	Wed 2/24/10	Wed 2/24/10
37	**ST Wrap-up**	**Wed 3/3/10**	**Wed 3/3/10**
38	**ST Report**	**Thu 3/4/10**	**Fri 5/7/10**