

WSR-88D Tropical Cyclone Operations Plan

05/01/2018 Build 17.X Systems

NOTE

For assistance with this Operations Plan at any time, contact the WSR-88D Field Support Hotline.

OPERATIONS PLAN GUIDANCE

- The plan is designed to be used as an *operational reference*. Consult with the local Unit Radar Committee (URC) **in advance** concerning any changes that might result in system wide modifications. Reminder, in accordance with the [Memorandum of Agreement for the Interagency Operation of the WSR-88D](#), all WFOs are tasked to conduct URC meetings twice per year. In addition to any local contacts, WFOs are encouraged to include the email address roc.urb.invite@noaa.gov to invite the tri-agency NEXRAD program managers and the Hotline. Pre-hurricane URC agreements will allow changes to be made operationally as the need arises.
- A few colors are used in this document. **Blue** indicates a hyperlink or a link to a different location in this document (i.e. an email address or an internet address). **Red** is for a menu or a menu selection. **Green** font is used in the **NOTE** section and serves as an informational section. **Yellow** background is a note that provides operational guidance.
- Changes will likely be made to adaptable parameters settings prior to and during a tropical cyclone. It is recommended that a backup of adaptable parameters be made prior to the event. The “**Adaptation Data Backup**” procedure is in Table 4-34 (Page 4-111) of Build 17.0 version of EHB 6-520 (Revision No. 7, dated 1 August 2016). It can be accessed with a secure login through the ROC website <https://www.roc.noaa.gov/WSR88D/Program/MaintenanceManuals.aspx>.
- Keep in mind that the recommended adaptable parameter changes in this Plan are performed by the WFO using the URC level change of authority. There are **NO commands** requiring Agency- or ROC level passwords in this document.

NOTE: The following RDA and RPG features are important to be aware of during a tropical weather event. They each serve to remind and explain their importance and how they impact the operational use of the radar.

RDA Processing Algorithms

- VCP 12 or 212 allows for **MESO-SAILS to be used**. SAILS is *Enabled* and *active*, “x1”, “x2”, or “x3” is added to get more updates on the lowest elevation cut.

NOTE: When the VCP changes to 12 or 212, with SAILS being Enabled, there will be no SAILS cut for the first volume scan. On the next and subsequent volume scans, the SAILS elevation cut(s) will be available.

- **CMD** (Clutter Mitigation Decision) should be used as opposed to Clutter Suppression Regions or a static Bypass Map.
- **AVSET** (Automated Volume Scan Evaluation and Termination) is a feature that produces faster volume scan updates even when a tropical cyclone is still fairly distant from the radar site.

RPG Processing Algorithms

In Build 17.0, the default Z/ZDR relationship for Dual Pol Quantitative Precipitation Estimation (QPE) has been changed to the *Continental* equation.

NOTE: With the default QPE R(Z,ZDR) setting now being labeled as *Continental*, situational differences and site dependencies are factors in determining whether a site uses the *Continental* or the *Tropical* relationship. Additional information is found in the WDTD’s RDA/RPG BUILD 17.0 Training, starting on page 20. In addition, QPE R(Z, ZDR) might not be used for events in the same way as the *Tropical Z-R* relationship for Legacy PPS.

- In Build 17.0, the RPG Alarm **RDA Wideband** has been renamed to **Backup Comms**. The alarm shows when the backup (4G or VSAT) communication is in use. While FAA Systems may have 4G or VSAT backup communications installed, this alarm only applies to NWS and DoD Systems at the current time.
- Storm-Based Auto PRF enables an automatic change in the PRF. This prevents “purple haze” (range folding) from obscuring velocity data based on the three strongest storms (depending on Cell-Based VIL).
- PRFs can be edited in the 200 series (i.e. SZ2) VCPs but the same PRF must be

used in all 3 sectors.

- Ensure the appropriate velocity increment (0.97 kt or 1.94 kt) for the anticipated maximum velocities is being used. Monitor the 2DVDA algorithm performance during the tropical storm/cyclone.
- The QPE Max Precipitation Rate (DP Max Precip Rate) is a URC parameter. The *default* is **200 mm/hr** with the range of possible values being as low as **50 mm/hr** up to **500 mm/hr**.
- The parameter “Maximum Reflectivity for use of R(Z, ZDR) in Heavy Rain” is the maximum value for using the R(Z,Zdr) relationship, above which a sample bin with Heavy Rain (HR) will use R(Kdp) instead.
- It is encouraged to **issue a Free Text Message (FTM)** to All Users from the MSCF notifying neighboring WFOs, the national centers, River Forecast Centers, the NEXRAD tri-agencies, and the weather enterprise when major operational changes are made (e.g. resetting precip accumulations, changing adaptable parameters, etc.).
- After the tropical cyclone threat has passed, ensure all parameters are returned to their original values. The “**Restore Adaptation Data**” procedure is in Table 4-35 (Page 4-113) of the Build 17.0 version of EHB 6-520 (Revision No. 7, dated 1 August 2016). **Keep this information near the MSCF in case the data need to be restored.** If data is entered manually, refer to the current *WSR-88D Guidance on Adaptable Parameters Handbook*, Volume 1 (Revision No. 7, dated 1 August 2016) for system-wide defaults and your own notes for your site-specific ones. It can be accessed at <https://www.roc.noaa.gov/WSR88D/Program/OperationsManuals.aspx> (which requires a security log-in).
- This Tropical Cyclone Operations Plan has been designed for sites that are using Build **17.X** software. If there is a question about the RPG software build being used, check with maintenance technicians or radar focal point. Contact the **WSR-88D Hotline** for immediate issues or concerns.

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NOTE: Procedures 1 through 8 are performed at the RPG HCI and 9 through 11 are performed at your AWIPS Workstation. Some procedures may require the URC-Level Password.

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At the WSR-88D RPG Human Computer Interface (HCI):

1. Generator Fuel

Approximately three days prior to a tropical cyclone, ensure that the RDA emergency power **generator fuel level** is adequate. The levels can be checked by selecting the **Tower/Utilities** tab under the **RDA Performance Data** window.

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NOTE: With the removal of the RDA UPS, it is important that Procedure 1 has been performed and all components are working properly.

2. Reinitializing Memory and Precipitation Accumulations

2a. It is recommended that a **Restart** of the RPG Software be performed from the RPG Control window prior to a tropical cyclone. An “**RPG Clean Startup**” can be done as an alternative. If changes were made to the *Adaptation Data*, then an *Adaptation Data Backup* should be performed or else changes will be lost when the Clean Startup is executed.

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2b. Reset the Dual Pol QPE, Legacy PPS, and Differences products from the RPG Control window prior to the tropical event. This should be done in conjunction with your Service Hydrologist and River Forecast Center.

NOTE: Do not shutdown the RPG Software while resetting rainfall accumulations. If a Clean Startup was performed in step 2a, then this step can be skipped.

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2c. Values used for starting and ending precip accumulations should be set to reasonable numbers. The Reflectivity rain rate values used to initiate accumulation should remain the *default* values. For Legacy PPS, the **RAINZ** default is **20.0 dBZ**. For Dual Pol Precip, **PAIF Rate Threshold** is **0.5 mm/hr**.

The *Area Thresholds* (**RAINA** for Legacy PPS and **PAIF Area Threshold** for Dual-Pol Precip – Both set to **80 km²** by *default*) should be determined locally during fair weather by viewing the **Significant Rain Area Detected** in the **Precipitation Status** Window. Alternatively, the *TOTAL RAIN AREA* is listed on the *Supplemental Precipitation Product* (**SPD**) on AWIPS (via **WSRSPDxxx** (where xxx is the 3-letter radar identifier)). These parameters are viewed/modified on the **Algorithms** Window (via the **Hydromet Preprocessing** and **Dual-Pol Precip** screens).

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3. Clutter Suppression

Use “CMD” whenever possible. This helps improve rainfall estimates and overall algorithm performance. **CMD enabled** is generally better than using either operator-defined Clutter Suppression Regions or a static Bypass Map because ground clutter locations change with beam propagation. CMD Status is displayed at the lower right of the HCI.

For additional information on Clutter Suppression and its usage refer to Section 3.8.9 in the EHB 6-521 (Operations Instructions RPG Refresh (Linux) Manual, Revision No. 7, dated 1 August 2016). It can be accessed through the Radar Operations Center website <https://www.roc.noaa.gov/WSR88D/Program/OperationsManuals.aspx>.)

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4. Mode and Volume Coverage Pattern (VCP) Selection

4a. Mode Selection Function (MSF)

In order to ensure that the automatic MSF doesn't override the VCP you have selected, set the Precipitation and Clear Air Switching selections to ***Manual and Manual***.

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4b. VCP Selection and Velocity Dealiasing

The following table summarizes the recommended VCPs with their limitations and optimal usage in tropical cyclone events:

VCP	Tilts	Time*	Usage	Limitations
121	9	6 min.	Compared to other VCPs, this one significantly reduces range-obscured V/SW data within 230 km and is also useful when a tropical cyclone has a distant center or eye with no echoes near the radar. This should be the first choice for mitigating velocity dealiasing problems.	There are gaps in coverage above 5° and low elevation circulations may be missed. All Bins clutter suppression is NOT recommended. Likewise, PRFs are not editable for any tilt.
221	9	6 min.	This reduces range-obscured V/SW data out to 300 km when compared to other VCPs. It is useful when a tropical cyclone has a distant center or eye. This should be the fourth choice for mitigating velocity dealiasing problems.	There are gaps in coverage above 5° and low elevation circulations may be missed. All Bins clutter suppression is NOT recommended.
211	14	5 min.	This is useful when a tropical cyclone has a center or eye relatively close to the radar. It significantly reduces range-obscured V/SW data when compared to VCP 11. This should be the second choice for mitigating velocity dealiasing problems.	All Bins clutter suppression is NOT recommended.

VCP	Tilts	Time*	Usage	Limitations
**212	14	4½ min.	This has increased low-level vertical resolution compared to VCP 211. Significantly reduces range-obscured V/SW data when compared to VCP 12. This should be the third choice for mitigating velocity dealiasing problems.	All Bins clutter suppression is NOT recommended. Due to its faster rotation rate, VCP 212 has sampling that is not quite as good as that of VCP 211.
**12	14	4 min.	This VCP is good for detecting severe convective events (e.g., TVSSs) particularly for tropical cyclones over land. Extra low elevation angles increase low-level vertical resolution when compared to VCP 11. It has the fastest update rate.	Velocities need to be monitored closely (for range folding) around the center or the eye. With PRFs possibly needing to be manually changed, the use of Storm-Based Auto PRF may help. Also note that high antenna rotation rates slightly decrease the accuracy of the base data estimates.

* VCP update times are approximate.

** The VCP time changes if SAILS and/or AVSET are enabled.

For a more comprehensive overview of *all* VCPs, see Figure 3-11, the “VCP Comparison Table” in EHB 6-521 (Revision No. 7, dated 1 August 2016).

Simplifying the choices and prioritizing by the primary concerns:

Choice	Velocity Dealiasing	Tornado Detection
#1	121	212
#2	211	211
#3	212	121

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4c. Mitigation of Range Folding

By selecting **Manual PRF** on the **PRF Control** window, operators have the ability to move the maximum unambiguous range (R_{max}) out to **94 nm** and the minimum distance in to **63 nm** by adjusting the PRF when allowed by the VCPs described in the table under Section 4b (VCP Selection and Velocity Dealiasing). **Manually-selected PRFs** can be defined for up to three sectors. Remember, the SZ2 VCPs (211, 212, and 221) cannot be sectorized.

Auto PRF Storm is useful when embedded severe convection is present with a tropical cyclone. Typically, this is the default setting. In addition, **AUTO**, referring to the legacy ‘Auto PRF’, appears when the elevation-based option has been chosen.

For additional information, refer to the Guidance on Adaptable Parameters. (WSR-88D Handbook, Volume 1, RPG, Revision No. 6, dated 1 of August 2016).

NOTE: The NHC prefers the R_{max} with sufficient range to provide velocity data near the eye or center of a tropical system. However, local needs may dictate otherwise, and will take precedence. Therefore, a VCP with an operator-specified PRF (e.g., VCP 12) may be needed to mitigate range folding in the region of

concern. VCP 121 does not use Auto PRF.

For further information about the improved Auto PRF function, see <https://www.roc.noaa.gov/WSR88D/NewRadarTechnology/NewTechDefault.aspx>.

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4d. AVSET (Automated Volume Scan Evaluation and Termination)

Use **AVSET** whenever possible. AVSET will often produce faster volume scan updates. It terminates the volume scan when there are no echoes of at least 18 dBZ at elevations above 5° covering at least 80 km² (which is smaller than a convective cell with a diameter of 5.5 nm).

For additional information about AVSET, see Section 2.3.16.5.2 in EHB 6-521 (Revision No. 7, dated 1 August 2016).

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4e. SAILS (Supplemental Adaptive Intra-volume Low-level Scan)

SAILS is a scanning technique that inserts an extra low elevation split cut scan (0.5 degree elevation) in the middle of the VCP. This is only applicable for VCPs 12 and 212 and the actual mid-level elevation angle where this extra scan is inserted varies depending upon whether AVSET is being used. In addition, Build 16.1 adds the ability to select 1, 2, or 3, additional low level scans (i.e. MESO-SAILS). The SAILS status displays to the right of the radome, just below the VCP & AVSET indicators.

For additional information about SAILS, see Section 2.3.16.5.3 in EHB 6-521 (Revision No. 7, dated 1 August 2016).

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5. Velocity Increment for Extreme Wind Speeds

Velocity measurements are limited to approximately +/- 122 kts when velocity increment is set to 0.97 kt. When hurricane speeds exceed 122 kt, NHC recommends operators change the velocity increments to 1.94 kt (from 0.97) **prior** to the hurricane becoming a Category 3 storm.

The velocity color scale displayed with all 8-bit (256-data level) Velocity products on AWIPS is the same. This could create confusion on which velocity increment is being used. Fortunately, the AWIPS CAVE cursor sampling of the velocity products indicates speeds **in tenths of a knot** for velocity increments of **0.97 kt** and **in whole knots** for velocity increments of **1.94 kt**. The velocity increment setting is located on the **VCP and Mode Control** button. It is found by clicking the **VCP** button on the RPG HCI window.

NOTE: Changing the Velocity Increment to 1.94 knots automatically switches the RPG to the legacy velocity dealiasing algorithm.

NOTE

Ensure the velocity increment is the last change you make when modifying a VCP. Otherwise, changes will be lost when a VCP change is made or the system is rebooted.

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6. Algorithm Adaptable Parameter Changes

NOTE: Procedures 6a and 6b will independently increase the radar's detection efficiency for small, shallow circulations typically found in tropical cyclones. Precipitation algorithm changes (procedures 6ci and 6civ) will result in more realistic rainfall estimates during tropical weather situations.

6a. Mesocyclone Detection Algorithm Optimization

The Minimum Display Filter Rank should be lowered to enable detection of weaker circulations within the tropical cyclone. However, doing this particular procedure may result in a greater number of false alarms being generated. To help reduce the false alarm rates, detections must be within 20 km of a SCIT-identified cell.

Select **MDA** (under **Algorithms** → **Adaptation Item**) and change **Minimum Display Filter Rank** from **5** to **4** (or even **3**).

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6b. Tornado Detection Algorithm Optimization

Similar to MDA, TDA values should be changed to better detect weak or distant tornadoes. Select **Tornado Detection** (under **Algorithms** → **Adaptation Item**) and change **(i) Min 3D Feature Depth** from **1.5** to **1.6**; **(ii) Min 3D Feat Low-Lvl Delta Vel** from **25** to **27**; and **(iii) Min TVS Delta Velocity** from **36** to **27**.

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6c. Precipitation Estimate Optimization

NOTE: Subsections i and ii refer to PPS (legacy) radar rainfall estimation parameters and subsections iii, iv, and v refer to the QPE (DP) algorithm. In addition, exclusion zones should be set the same in both PPS and QPE. Other changes (i.e. Z-R relationship, maximum precipitation rate) should be coordinated with the servicing River Forecast Center(s) (RFCs).

i. PPS Z-R Relationship

As a reminder, it is generally recommended to change the Z-R relationship from convective (**300R^{1.4}**) to the tropical (**250R^{1.2}**) during tropical events. The MRMS (developmental) website (https://mrms-dev.nssl.noaa.gov/qvs/simple_product_maps.php) has a tool that shows where tropical rainfall will likely occur (**click above link** → **Model (Blended)** → **Tropical Rain Prob**).

NOTE: While monitoring precipitation accumulations compared to rain gauges, it is important to not change Z-R relationship too soon. This will result in radar overestimation. Contact your River Forecast Center for guidance.

To change to the tropical Z-R relationship, select **Hydromet Rate** (under **Algorithms** → **Adaptation Items**) and change (i) **Z-R Multiplier Coef. [CZM]** from the *current setting* to **250.0** and (ii) **Z-R Exponent Coef. [CZP]** from the *current setting* to **1.2**. Continue to the next step to set the MXPRA parameter.

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ii. PPS Precipitation Rate Thresholds

While an emphasis is placed on the precip accumulations, it is important to address the precipitation rates as the tropical cyclone begins to impact the region. It is recommended that you change (also under **Hydromet Rate**) the **Max Precipitation Rate [MXPRA]** from its *current setting* to **150.0**.

Normally, changing the MXPRA (Maximum Precipitation Rate Threshold), default value being **103.8 mm/hr (4.1 in/hr)**, value to **150.0 mm/hr (5.9 in/hr)** is sufficient. However, the ROC recommends that the MXPRA *never* be set higher than **200.0 mm/hr (7.9 in/hr)**. For additional information, review Section 7.9.1 of the Guidance on Adaptable Parameters. (WSR-88D Handbook, Volume 1, RPG, Revision No. 7, dated 1 August 2015).

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iii. Dual-Pol (QPE) Maximum Reflectivity

While the Dual-Pol **Maximum Reflectivity** range is **45-60 dBZ**, the default setting is **53 dBZ** which helps mitigate hail contamination. The value can be changed by selecting **Dual-Pol Precip** (under **Algorithms** → **Adaptation Item**).

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iv. QPE Max Precip Rate

QPE Max Precip Rate is used to limit the maximum rainfall rate and is the Dual-Pol (QPE) equivalent of the PPS MXPRA. Select **Dual-Pol Precip** (under **Algorithms** → **Adaptation Item**) and change the **DP Max Precip Rate** from the *current setting* to between **150.0** and **200.0 mm/hr**, similar to MXPRA.

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v. R(Z, ZDR) Tropical vs Continental

Sites can use either the *Continental* (which is now the *default*) or the *Tropical equation* for QPE. The selection can be made by selecting **Dual-Pol Precip** (under **Algorithm Adaptation Item**). This allows for the switch from the Continental to Tropical.

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6d. Using Model Data

i. Settings for Sites With Model Data

WFOs across the contiguous US and Puerto Rico have access to the **RAP Model data** via AWIPS. The operator can verify that **Melting Layer Source** is set to **Model_Enhanced** (under **MLDA** via **Algorithms**) and **Model Update** is **On** (from the main HCI).

In order to verify that new model data are actually being received from a host AWIPS, look for the **MODEL DATA** entry shortly after the top of each hour in the RPG Status window.

The Model Data Viewer Tool can be utilized to examine the model data by the RPG to ensure it is correct and representative of the environmental conditions. See Section 2.3.17.9.6 of the EHB 6-521 (Revision No. 7, dated 1 August 2016) for more information about the Model Data Viewer.

If a WFO is unable to use RAP data, then the Operator will need to update environmental data by manually entering data from a sounding closest to the radar site.

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ii. Settings for Sites Without Model Data

Sites outside of the contiguous US do not receive model data and should set the **Melting Layer Source** to **Radar_Based** (under **MLDA** via **Algorithms**). Also, use the **Environmental Data Entry** window (under **Environmental Data**) to update the **Height 0 C (0-70 kft MSL)** and **Environmental Wind** data using a local or interpolated sounding as a guide. For additional information on the manual setting of environmental data, see Section 3.10.4 in the EHB 6-521 (Revision No. 7, dated 1 August 2016).

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7. Precipitation Product Display Levels

Adjustment to the precipitation data display levels will be needed if the potential for heavy rainfall is expected as the tropical cyclone approaches the radar site. The maximum displayable value for One Hour Precipitation (**OHP**), Three Hour Precipitation

(**THP**) and DP One Hour Accumulation (**OHA**) is **12.7 inches**. Likewise, the maximum displayable value for Storm Total Precipitation (**STP**) and 4-bit DP Storm Total Accumulation (**STA**) is **25.4 inches**. User Selectable Precipitation (**USP**) uses the **OHP/THP and OHA Data Levels** unless the maximum value exceeds the value set for code 16. Otherwise, **USP** uses the **STP, STA Data Levels** values.

Select **OHP/THP, OHA Data Levels** and **STP, STA Data Levels** (under **Selectable Parameters**) to set the desired Precip data levels.

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8. Archive Level II

Sites can check the status of Level II data by going to <http://radar2pub.ncep.noaa.gov/>. As a reminder, NWS sites are responsible for monitoring their assigned DoD and FAA site(s).

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AWIPS Preparation (at an AWIPS Workstation):

9. Data Archiving

Prior to a tropical cyclone, WFO should confirm that their Data Archiver is running. With the recent upgrade to AWIPS-II, archiving of the data is a permission-based application and it can only be activated by the System Manager or User Administrator.

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10. Data Requests from Adjacent Radars

As a tropical cyclone approaches your Radar Site, an RMR can be initiated to surrounding sites for products not available via SBN (Satellite Broadcast Network). To view the products available via the SBN, see

http://www.nws.noaa.gov/tg/pdf/noaaport_radar_products.pdf.

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11. Communications Backup

Ensure you have printed out a copy of your latest AWIPS radar file help sheet and WSR-88D Communications Documentation.

The AWIPS radar file help sheets provide site-specific radar access information that could prove pivotal in the event default telecommunication systems become inoperative during a tropical event. Similarly, each office's WSR-88D Comms Documentation provides site-specific telecoms information for the NWS and NEXRAD tri-agency partners. Both sets of documentation are maintained on a secure server at the ROC. ESAs at each office have been provided with the necessary information to access those servers. Contact the WSR-88D Hotline for assistance if your ESA or technicians are not available to provide you with these documents or if they have trouble accessing either server.

AWIPS to WSR-88D "WAN Dedicated" operations could prove pivotal in the event one WFO needs to perform WSR-88D backup transmission for another WFO. WFO WAN Dedicated permissions were rolled over from AWIPS 1 to AWIPS 2 during the A2 transitions. We cannot recommend strongly enough that this functionality be tested during benign weather and well in advance of any land-falling tropical system, as the functionality requires pre-constructed and saved RPS Lists for each VCP for each WSR-88D to which your WFO may have access. And this recommendation is especially true of locations that might not have re-tested the functionality in the wake of their AWIPS system being transitioned to AWIPS 2.

All Gulf of Mexico and Atlantic coastal WFOs from Brownsville, TX to Portland, Maine, exception being Taunton, MA, have an AWIPS WAN dynamic failover capability via built-in OPSnet VSAT if the terrestrial OPSnet WAN fails.

All WSR-88Ds in CONUS, Puerto Rico, and the Hawaiian Islands that rely on commercial telecoms for either the wideband circuit or the primary DoD or FAA to NWS private-IP connection, now have either 4G wireless or permanent (built-in) VSAT auto-failover backup installed. The WSR-88D Comms Documentation for those locations includes the 4G or VSAT backup comms data.

If your office relies on Backup comms for either the wideband or private-IP to a DoD or FAA WSR-88D, in advance of any land-falling tropical system check with the applicable WSR-88D maintenance staff and determine when NWS EHB 6-503-2 Preventive Maintenance Inspection Work Cards 2-009A (28 Day Status Check) and 2-019A (84 Day Backup Comms Fail-over Test) were last accomplished. Ideally, Backup comms fail-over will be confirmed in advance of any land-falling tropical systems.

In advance of major land-falling tropical systems NEXRAD enterprise telecom Providers are asked to place a heightened watch on the telecoms they provide to the NWS and WSR-88D systems in the forecast path of any major land-falling tropical system.

The ROC, Regional Focal Points, Office of Dissemination, and AWIPS NCF will partner to evaluate and initiate restorative telecommunication (telecom) solutions, backup scenarios, tertiary, and emergency restorations as required.

For additional information on contingency and operations plans, refer to System

Security Manual EHB 6-504 (Change 2 1 August 2016). Likewise, radar service backup is addressed in NATIONAL WEATHER SERVICE INSTRUCTION 10-2201, Appendix I Communications Backup.

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A copy the National Hurricane Operations Plan can be found on the Office of the Federal Coordinator for Meteorology's website (www.ofcm.gov).

After the tropical cyclone threat has passed, all parameters will be returned to their original values. The "**Restore Adaptation Data**" procedure is in Table 4-34 of the Build 17.0 version of EHB 6-520 (Revision No. 7, dated 15 September 2016). If the data needs to be manually entered, then refer to the current WSR-88D Guidance on Adaptable Parameters Handbook, Volume 1 (Revision No. 7, dated 1 August 2016) for system-wide defaults.

For all other inquiries or concerns about the information contained in this document, contact the NEXRAD Hotline.

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