

WSR-88D Program Software Changes
That May Impact
Radar Product Central Collection Dissemination Service (RPCCDS) Users

Updated 27 January 2004

PURPOSE:

This summary is intended to assist RPCCDS users plan for WSR-88D changes which may impact data format, data frequency, or data quality. While many changes are made to the WSR-88D Radar Product Generator (RPG) software issued during the 6-month software releases, only a small subset may affect RPCCDS users. The changes made in each RPG software release are listed at:
<http://www.roc.noaa.gov/ssb/cm/software/>.

There are no plans to add to or delete products available on the RPCCDS. No format changes for products on the RPCCDS are planned.

CURRENT:

RPG Build 4: The Radar Operations Center began releasing this software to field sites on 29 September 2003. See the following web site for a list of RPG software the sites are using:
<http://ssm.roc.noaa.gov/build.asp>

Changes In Build 4.0 that may affect RPCCDS users include :

A change to the Precipitation Rate/Accumulation algorithm-task of the WSR-88D Precipitation Processing System (PPS) corrects the cumulative effect of slight truncations occurring during the determination of accumulations. This problem in some cases might have contributed to an underestimation of rainfall. The degree of the problem varied with the meteorological situation and the product, with the greatest impact experienced in hourly-based products (e.g., One Hour Precipitation (OHP); Three Hour Precipitation (THP); User-Selectable Precipitation (USP); Hourly Digital Precipitation Array (DPA)) during sustained, light precipitation events and the least impact experienced in the Storm Total Precipitation (STP) product during short-lived, heavy events. In worst-case situations, the impact of the problem could be quite substantial, with up to 2 mm of accumulation being lost per hour in the hourly-based products accumulated over the duration of the storm. The DPA product alphanumeric block has been changed to include a maximum of 18 layers; prior to Build 4 the maximum was 15. The number of layers was increased in preparation for the introduction of VCP12 in Build 5. The number of layers increases when VCP 12 is used with Build 5 because certain layers contain information specific to each volume scan contributing to the hour of precipitation. This makes for possible larger products. The version number has been updated from 1 to 2 to reflect the difference. Also, the Supplemental Precipitation Data (SPD) product has been modified to include up to 16 (formerly 13) Rate Scan entries in the PPS Supplemental Data portion (the version number has not changed). Refer to the Build 4.0 RPG to Class I User ICD and the Product Specification ICD (2620001F) for additional information (http://www.roc.noaa.gov/ssb/cm/icd_downloads.asp).

PLANNED CHANGES:

Build 5: The Radar Operations Center plans to begin a beta test of Build 5 software to 7 field sites beginning 17 February 2004. The software is scheduled to be released to field sites beginning 29 March 2004.

Changes in Build 5.0 that may affect RPCCDS users:

1. Implementation Of Two New Volume Coverage Patterns (VCPs).

a. VCP12, a 14-elevation scan VCP requiring 4.1 minutes to complete will be implemented. Thus, VCP12 products RPCCDS users receive may be coming as frequently as 4.1 minutes and some of the scanning angles will change. The NWS plans to transmit to the RPCCDS data from the angles of VCP 12 that are the closest to the legacy angles (i.e. 0.5°, 1.3°, 2.4°, and 3.1°). While VCP12 will have the same number of elevation scans as VCP 11, denser vertical sampling at lower elevation angles will provide better vertical definition of storms, increase detection capabilities of radars impacted by terrain blockage to improve rainfall and snowfall estimates, result in more storms being identified, and provide quicker updates. More detailed information on this VCP can be found at: <http://www.roc.noaa.gov/app/vcp/index.htm> (VCP Gamma Deep Convection) and at: http://www.roc.noaa.gov/app/vcp/IIP1_22.pdf (See section 3, VCP Gamma). The NWS estimates the product data flow rate of VCP12 will be 146% that of VCP21 and 122% of VCP11. The NWS does not anticipate RPCCDS users will need to increase the bandwidth of their dedicated connections with this change.

b. VCP121, a 9-elevation scan VCP will be implemented. This VCP has the same elevation scan angles as VCP 21, but has 20 scans of data, vice the 11 scans VCP 21 has, and requires 5 minutes to complete vice the 6 minutes VCP 21 requires. This VCP will implement the multi-pulse repetition frequency dealiasing algorithm (MPDA) which will help mitigate range folding and velocity aliasing (the Doppler Dilemma). The product data created with this new VCP will not change for RPCCDS users, but the data should be higher quality and have fewer range folded areas. The NWS estimates the product data flow rate of VCP121 will be similar to that of VCP11.

2. Implement Field Site Ability To Specify Default Precipitation VCP. For the first time, sites will be able to set the default VCP the radar goes to in precipitation events. In the past, VCP 21 has always served as the default VCP. The NEXRAD agencies will initially instruct sites to keep VCP21 as the default precipitation VCP. Users of the RPCCDS will be informed in advance of a change in this policy.

3. Implement the Enhanced Preprocessing (EPRE) algorithm to replace the legacy Precipitation Processing System (PPS) Preprocessing Algorithm. The EPRE is required to support the new VCPs being implemented. In addition, while maintaining the functional philosophy of the legacy Preprocessing Algorithm (the reflectivity data used to generate precipitation estimates should come from the lowest uncontaminated, unblocked tilt), the EPRE applies refined logic and new information to generate enhanced Hybrid Scan reflectivity data, supplied to radar rainfall estimates and Radar Coded Message products. The EPRE: (1) Uses AP/Clutter identification from the Radar Echo Classifier (REC) to accurately remove clutter contamination on a bin by bin basis. (2) Allows the definition of Exclusion Zones, defined by Elevation/Azimuth/Range sectors, via adaptation data to further remove regions where residual clutter is likely (i.e., near the radar) or is frequently observed. (3) Uses radar blockage information that has higher precision and twice the spatial resolution of the legacy Occultation data. (4) Is not linked to the Precipitation Detection Function; rather, independent of radar mode, similar logic based on the Hybrid Scan reflectivity data inside the EPRE generates information pertaining to the rain/no rain condition

needed by other legacy PPS algorithms. Due to the revised manner in which EPRE constructs the Hybrid Scan, users may notice some differences in the precipitation products compared to the legacy versions in the patterns of anomalous precipitation, though the overall, quantitative precipitation amounts should be quite comparable. The Hourly Digital Precipitation Array (DPA) product, One Hour Surface Rainfall Accumulation (OHP) product, Storm Total Rainfall Accumulation (STP) product, Supplemental Precipitation Data (SPD) product, Digital Hybrid Scan Reflectivity (DHR) product, and Digital Storm Total Precipitation (DSP) product have been significantly modified to reflect replacement of numerous supplemental and adaptation data fields in the alphanumeric portions of the products, with new fields. The version numbers for these products remain at the Build 4 settings. Refer to the Build 5.0 RPG to Class I User ICD and the Product Specification ICD for additional information. (available in late March 2004 at: http://www.roc.noaa.gov/ssb/cm/icd_downloads.asp).

POSSIBLE/TARGET CHANGES:

Build 6: The beta test of Build 6 software to select field sites, locations to be determined, will begin in July 2004. The software will begin to be released to field sites at the end of September 2004.

1. Implement a snow accumulation algorithm. This algorithm will have hourly- accumulation products like those of the legacy precipitation products. The snow algorithm will use the EPRE that will be implemented in Build 5. It is not known at this time if the snow accumulation products will be added to the RPCCDS product list.
2. Implement the interface to the Open RDA. Beginning in September 2004, Open RDA hardware and software will be deployed. The deployments should be completed by the end of 2005. Though no new RPCCDS products will appear in Build 6 due to the Open RDA, there should be improvements in radar data quality due to the newer science and capabilities of clutter detection and cancellation and other data quality features the Open RDA will possess.
3. The format of all floating point data is changing from Concurrent Computer Corp. format to the ANSI/IEEE-754 standard format for floating point data. The Calibration Constant is the only floating point data provided in Level III products. The Calibration Constant is contained in Level III Reflectivity Products (e.g., R, CR, RCS, LRM, DHR) in the Product Description Block at halfwords 51,52.

ADDITIONAL INFORMATION:

Changes made to the WSR-88D software are in response to NEXRAD agency approved requirements. The list of changes are approved about 11 months before the software is released to the field. Thus, software contents beyond Build 6 is a projection/target, subject to final approval and change.

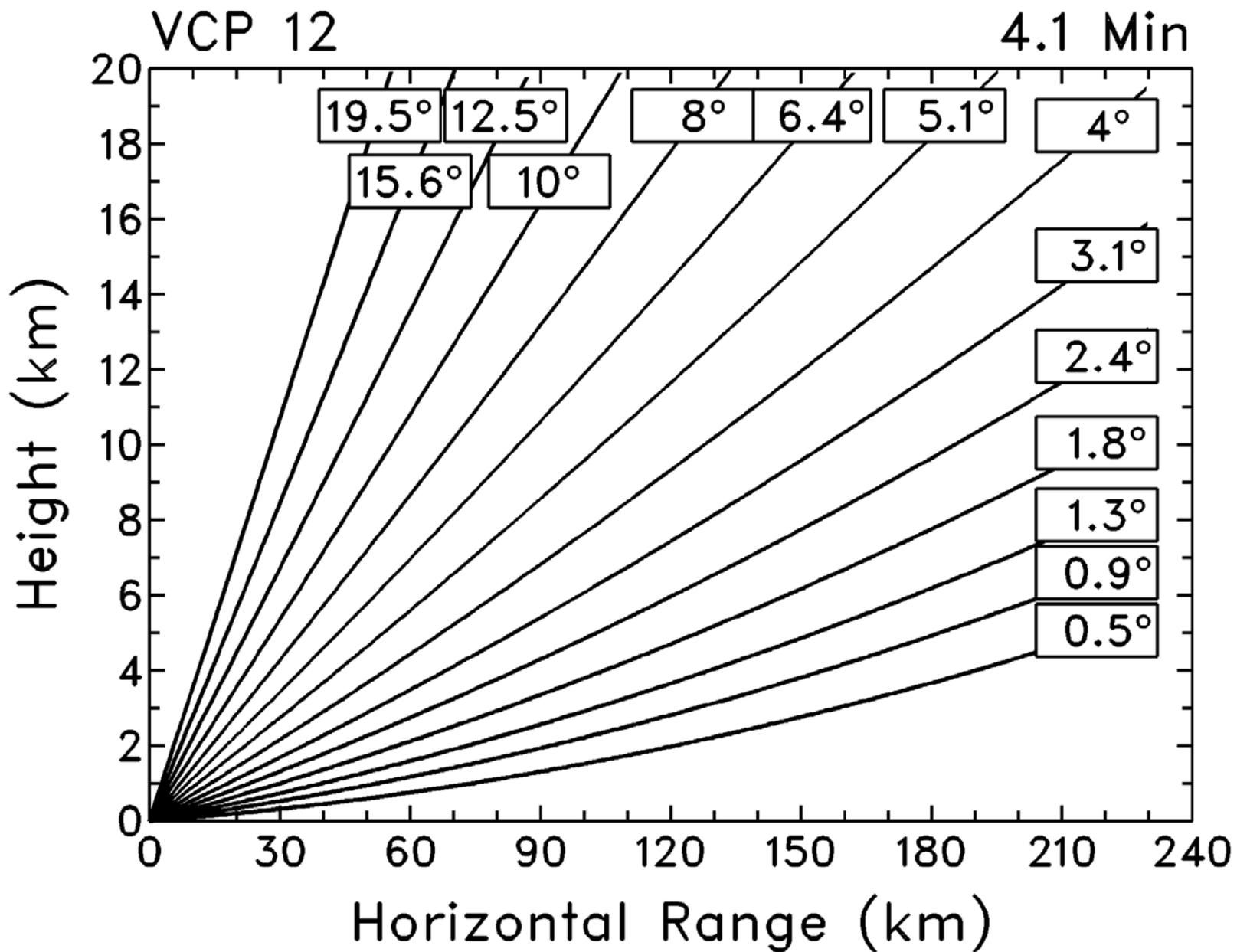
The Radar Operations Center (ROC) has a URL (<http://www.roc.noaa.gov/ops/ssm.asp>) for users to obtain:

- (1) A list of sites and which RPG software build the site is using, and
- (2) A list of sites and which volume coverage pattern the site is using, during the last automated hourly ROC call to the RPG.

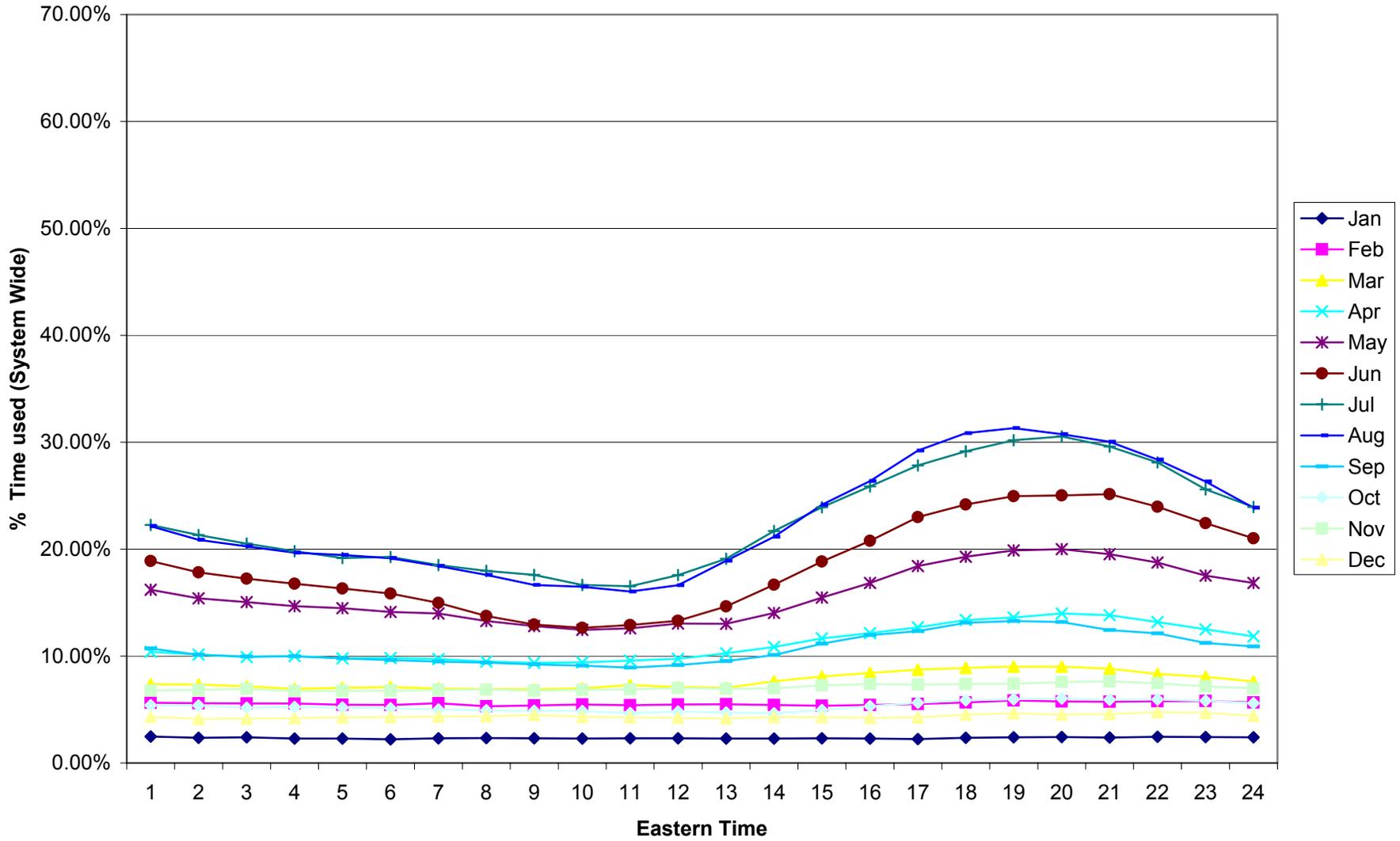
Warning Decision Training Branch training materials prepared for WSR-88D NEXRAD agency operators can be found in the Tech Updates section at the following URL: <http://www.wdtb.noaa.gov/>. While many of the changes discussed are not available on the RPCCDS, the training material provides information on new capabilities provided to NEXRAD Agency WSR-88D users.

The NWS conducted a study of the usage of the legacy VCPs WSR-88D sites use in operation, by hour. The NWS used the statistics obtained from the Radar Operations Center's System Status Monitor (SSM) which dials into all WSR-88D sites hourly to determine their operational status and mode of operation. While these statistics are averaged over a month and for the entire network, this is the first glimpse of VCP usage data at this resolution. In summary, the usage rate of VCPs changes by month and time of day - VCPs 11 and 21 usage reach a minimum in the winter and then peak in July/August around 1800L (Central). A review of the statistics going back to 1996 shows the peak summertime usage of VCP11, storm mode, has increased by a factor of 3 (~12% to 31%). Plots of the VCP usage statistics, by month and hour, for 2003 are attached.

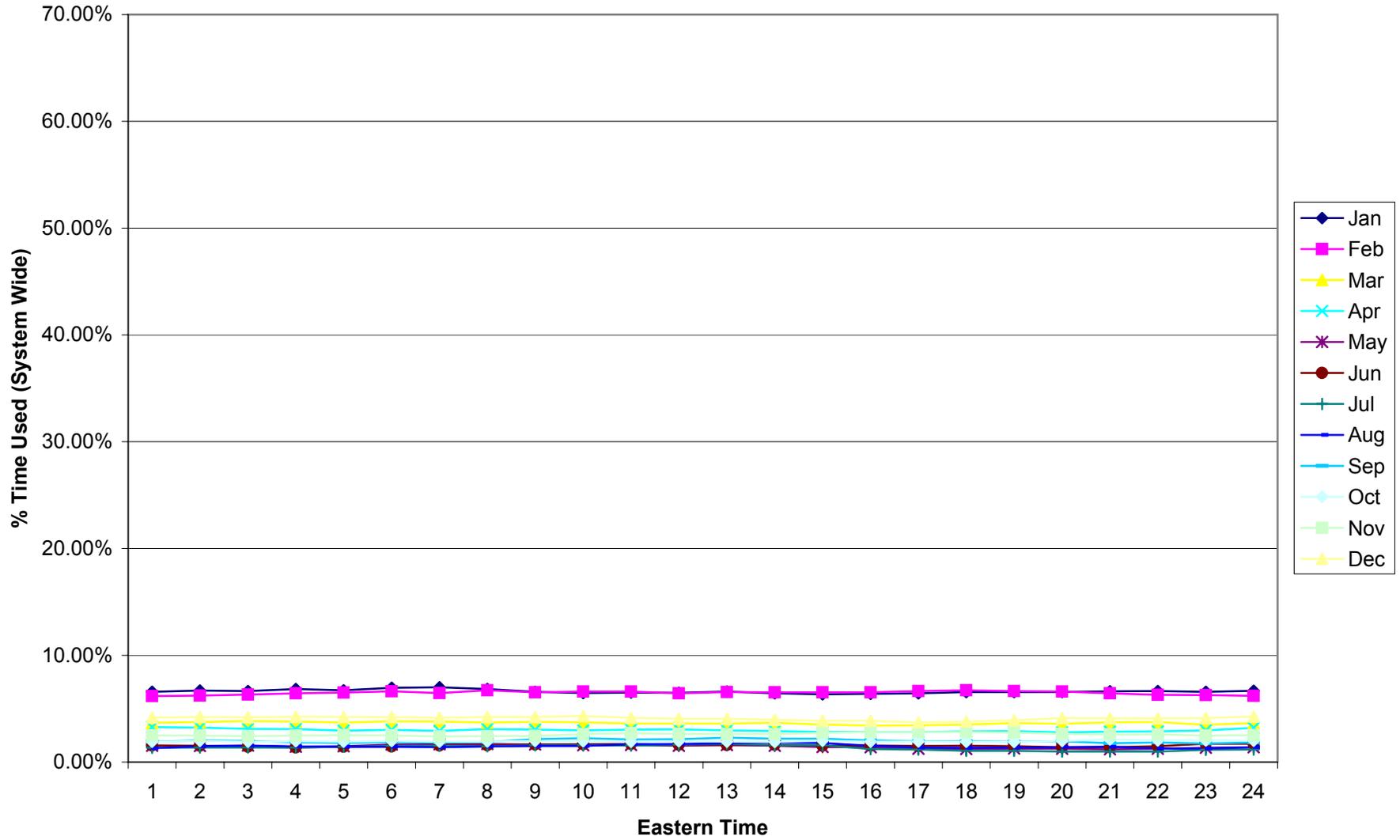
Please send suggestions, comments and questions on the materials in this summary to Tim.D.Crum@noaa.gov.



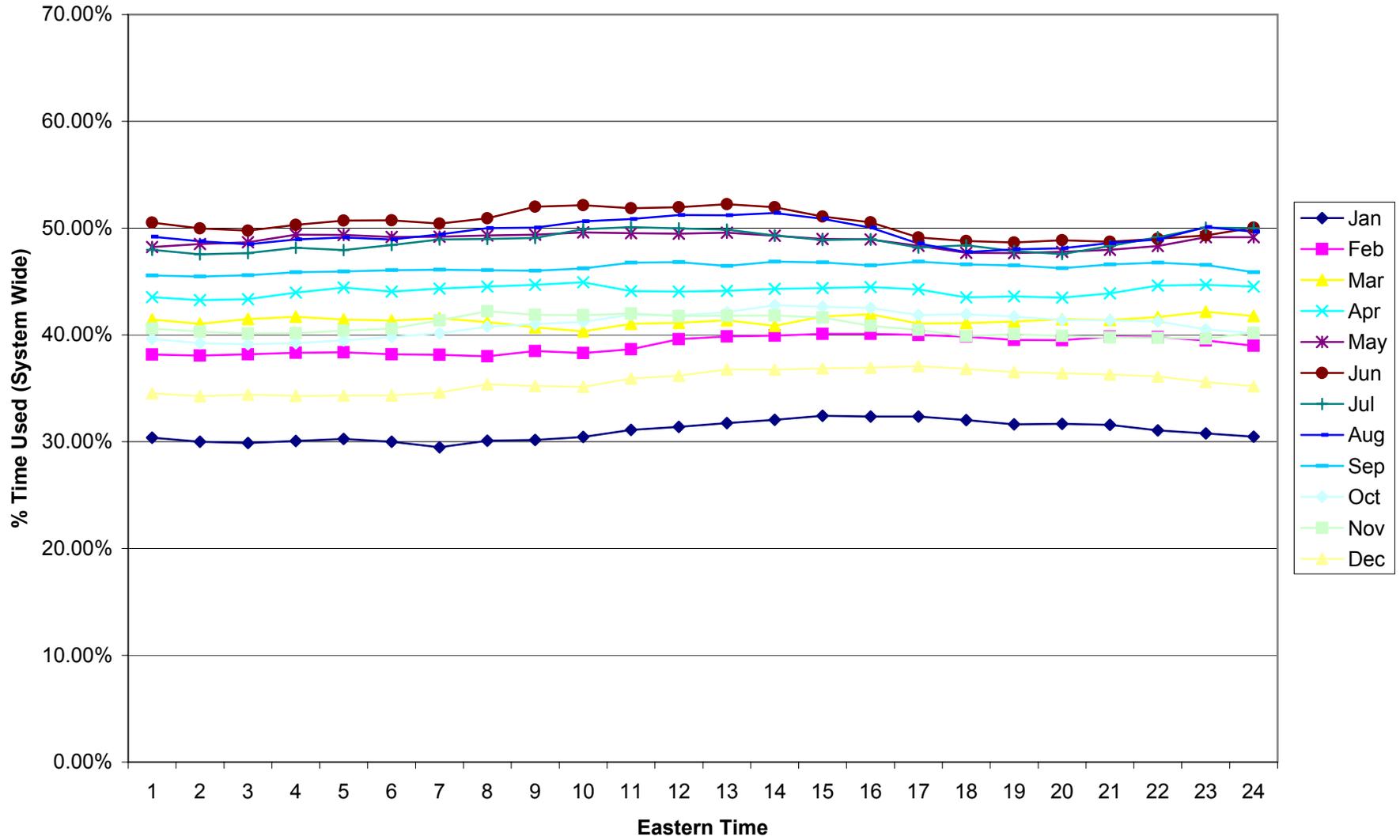
VCP11 Usage BY Month, By Hour (SSM Stats) - 2003



VCP31 Usage By Month, By Hour (SSM Stats) - 2003



VCP21 Usage By Month, By Hour (SSM Stats) - 2003



VCP32 Usage By Month, By Hour (SSM Stats) - 2003

