

HPC QPF Backup Procedures with SPC



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Background

- Where would you go to work if work was uninhabitable, inaccessible or you could not do your job on site?
 - Chemical Spill
 - Biological Toxin
 - Nuclear weapon
 - Bomb
 - Power Outage
 - Internet connectivity
 - Intranet connectivity
 - Major Communications Failure



Background

- 2001 Anthrax letters sent to Washington DC postal facility
 - NCEP received some mail from this facility
 - Potential shutdown of NCEP & suite of products
 - This started the ball rolling on Continuity Of Operations Plan (COOP)
- Where do we setup Backup Operations?
 - No NCEP center has a Complete Backup
 - TPC Backup is HPC
 - SPC Backup is USAF
 - OPC Backup is TAFB & WFO HLN
 - AWC Backup is USAF
 - Another NCEP Center? WFO? RFC?



Background

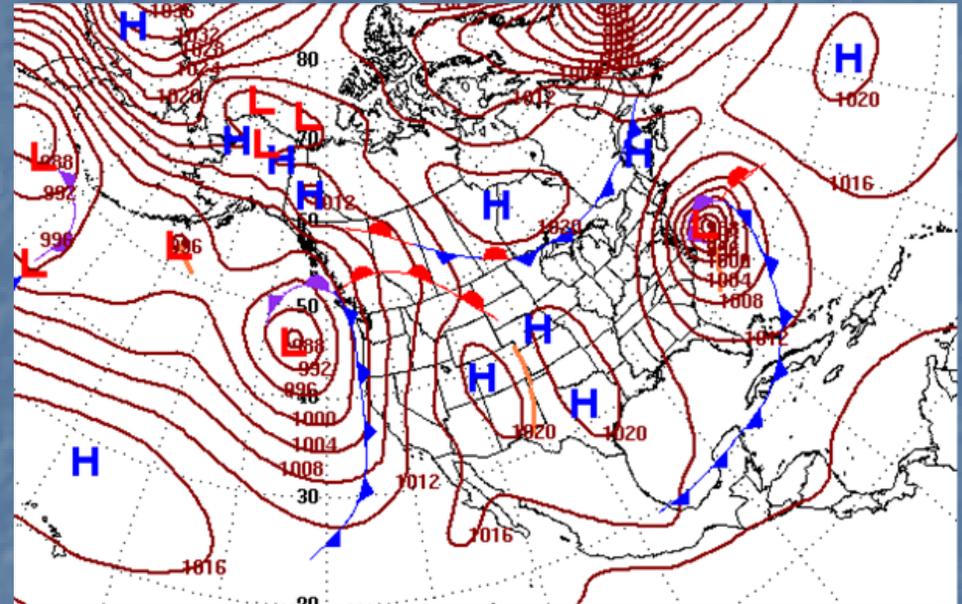
- Which products should we backup?
- Prioritizing of product suite
 - 150+ products issued each day from HPC
 - QPF, Winter, Model Diagnosis, Short & Medium Range, Surface Analysis & Alaska are all important to our users/partners
- QPF products becoming increasingly important
 - Guidance for WFO/RFC operations
 - Input for NWS Hydrologic modeling
 - 24 hour one-inch QPF is a Performance Metric for DOC, NOAA & NWS
- After in-depth research & coordination, SPC would backup HPC



Other HPC Products

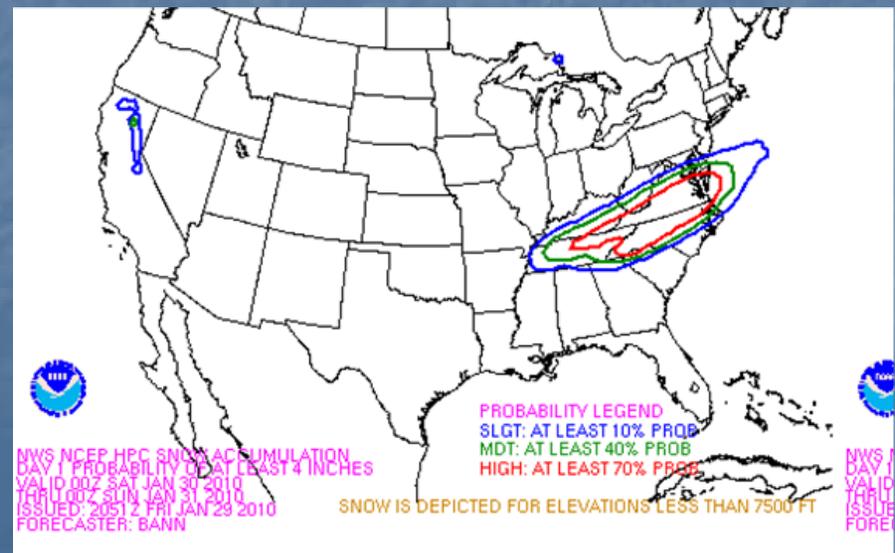
- Other products issued by HPC under consideration for Backup

- Winter Weather
- Short & Medium Range
- Surface Analysis
- Model Diagnosis
- Alaska Medium Range



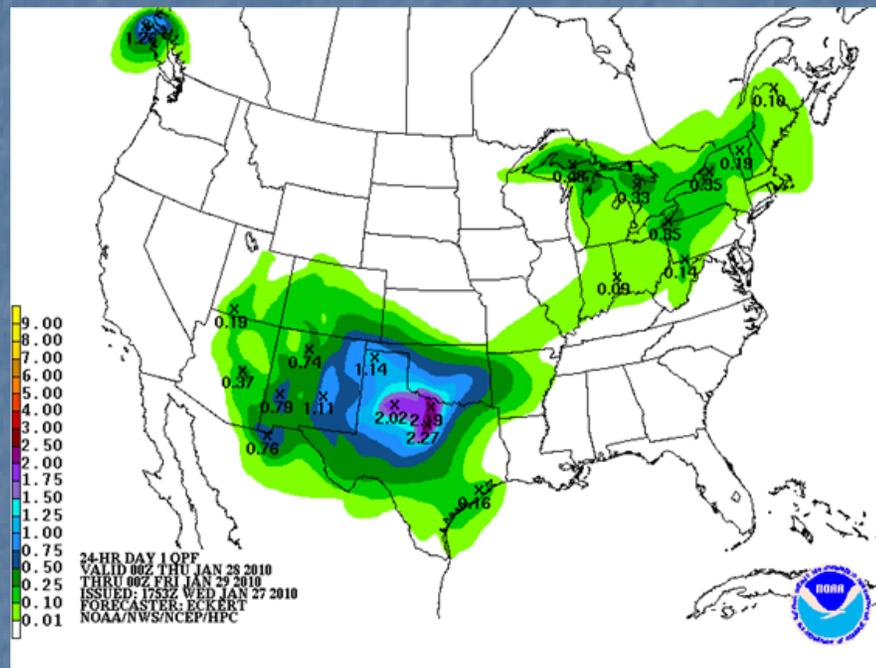
- Questions that need to be answered

- Who does the backup?
- Where do we ship operations?
- Specifics of When to backup?
- Very Involved process



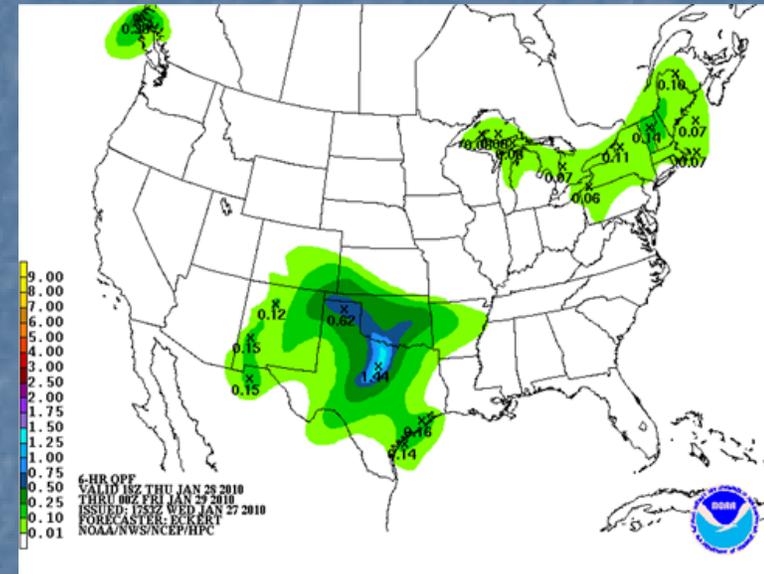
Backup QPF Product Suite Changes

- At this time QPF is the only HPC product that is backed up
- Daily QPF product suite is quite large
 - 42 – 6 hour graphical QPFs
 - 10 – 24 hour graphical QPFs
 - 4 – Graphical Excessive Rainfall
 - 6 – QPF Discussions
 - 4 – Excessive Rainfall Discussions
- All this handled by 5 forecast shifts during a 24 hour period
 - Can an office pickup this amount of extra work & complete their regular products?
 - Needed to adjust schedule and reduce the number of products issued in order to satisfy the Continuity of Operations (COOP)



Backup QPF Product Suite Changes

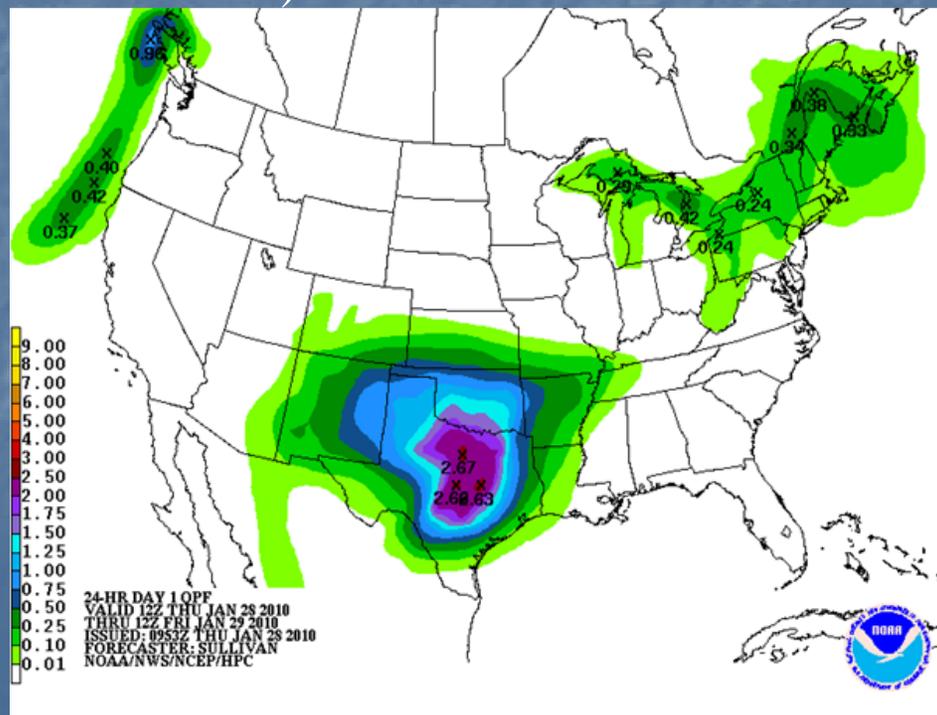
- Initial assessment resulted in:
 - Reduction of products in order to be covered by two forecasters per 24 hours
 - 26 – 6 hour graphical QPFs
 - 6 – 24 hour graphical QPFs
 - 4 – graphical excessive rainfall
 - 6 – QPF Discussions
 - 4 – Excessive Rainfall Discussions
 - SPC forecasters pickup the first 24 hours
 - HPC forecasters (two) would arrive and take over after 24 hours
 - If long term outage is expected then we run two – 10 hour shifts per day
 - SPC hosts workstations dedicated to QPF/Excessive Rainfall



Issued Backup Product Suite

Day Shift 12 UTC-22 UTC

- 1500 UTC – Excessive Rainfall Graphic & Discussion
 - Valid 15 UTC-12 UTC next day (21 hour forecast)
- 1800 UTC – Day 1 & 2 QPF Graphics
- 1800 UTC – Excessive Rainfall Graphic & Discussion
 - Valid 18 UTC-00 UTC next day (30 hour forecast)
- 2000 UTC – Day 3 QPF
- 2200 UTC – Day 1, 2 & 3 Discussion



Issued Backup Product Suite

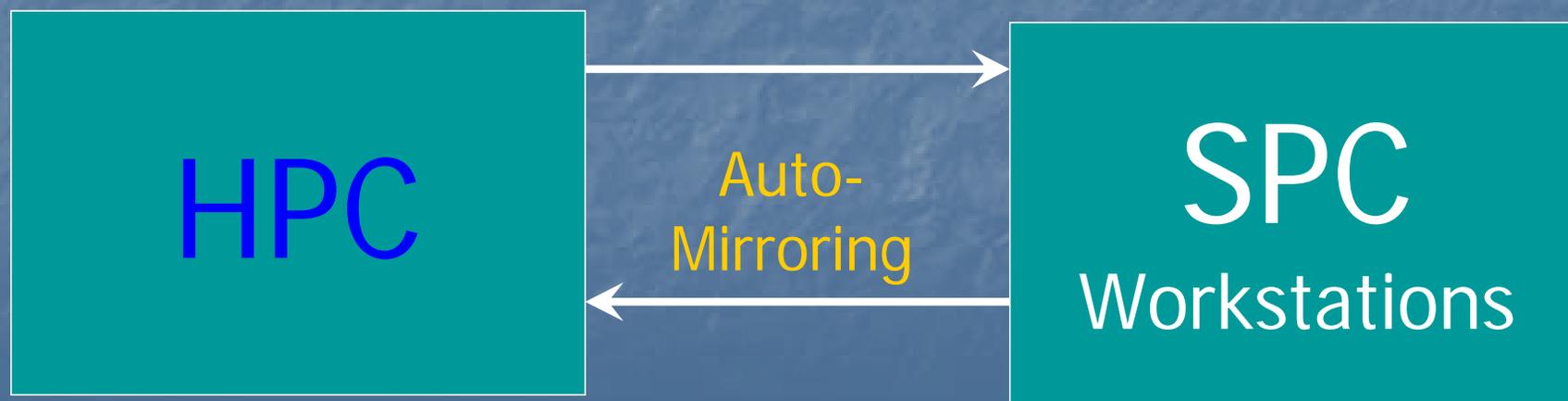
Night Shift 00 UTC-10 UTC

- 0300 UTC – Excessive Rainfall
 - Valid 03 UTC-00 UTC next day (21 hour forecast)
- 0600 UTC – Day 1 & 2 QPF
- 0600 UTC – Excessive Rainfall
 - Valid 06 UTC-12 UTC next day (30 hour forecast)
- 0800 UTC – Day 3 QPF
- 1000 UTC – Day 1, 2 & 3 Discussion



SPC Hardware/Software

- Backup runs on two Linux workstations at SPC
- Automatic mirroring process synchronizes the file contents of the two workstations, each of which is capable of supporting all backup functionality
- Same Linux operating system as the workstations at HPC
- The backup is self-contained, except that it relies on the data flow that supports SPC operations



SPC Hardware/Software

- Current HPC forecasts are mirrored to the SPC backup workstations
 - QPF 6-hour VGF files copied from HPC to SPC every five minutes
 - Seamless operations if backup invoked @ SPC
 - Zero time involved to invoke backup operations
 - Excessive Rainfall Graphics are not copied due to changing forecast time periods
- Data Flow is automatically monitored
- Failure to send vgf files results in emails sent to HPC/DTB personnel



SPC Hardware/Software

- Same operational scripts as used at HPC
 - Monitoring system detects changes to scripts and sends emails to HPC/DTB personnel reminding them to update scripts at the backup site
 - Backup uses the SPC version of two tables controlling access to the data flow modified for the HPC backup
 - Monitoring system detects when SPC has changed these tables so the HPC backup versions can be updated
 - SPC GUI is slightly different compared to the HPC GUI



SPC Hardware/Software

- Data flow & script execution are tested four times per day by an automatic backup system running on one of the two backup workstations
- Output from these tests is checked at least once per week
- Interactive capabilities and product launching are tested periodically by backup tests initiated from HPC, via remote login:
 - Products are created at HPC
 - Graphics files are copied to SPC
 - Processing/launching scripts are executed via remote login from HPC to SPC
- On site backup training and testing exercises are conducted at least once per year by HPC and SPC staff members
 - Several QPF Seminars & OJT

Manual SPC Backup Test History

- 2004 – Preliminary assessment of SPC capability to backup HPC QPF
 - Software/Hardware compatibility
 - Staffing
 - Training
- 2007 – Partial Success (On-Site SPC) Backup Test
 - Graphics = Yes
 - GRIB Files = No
- 2008 – Successful (On-site SPC) Backup Test
- 2009 – Failed (On-site SPC) Backup Test
 - Problems with hardware/software configuration
 - Problems solved and improvements made
- 2010 – Successful (On-Site SPC) ??????????????????????



Questions?

