

WSR-88D Data Status And Plans

TDWR-Only Version 10/3/2008

Michael Istok

NWS Office of Science & Technology

and

Tim Crum

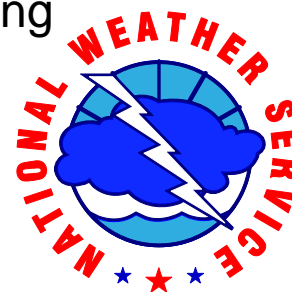
WSR-88D Radar Operations Center

18 June 2008

National Weather Service

Family Of Services/Partners Meeting

Silver Spring, MD





Overview



- The first 3 bullets have been removed in this file to emphasize the TDWR portion of the briefing presented at the June 2008 FOS meeting. All changes are noted in font color red. The full version is available at the following link:
<http://www.weather.gov/datamgmt/fos/fosmtg061808.html>
 - WSR-88D Level II Data
 - WSR-88D Level III Data
 - WSR-88D Dual Polarization Modification Plans
- TDWR Data/Product Plans



TDWR Plans



- NWS connections to remaining 35 TDWRs scheduled by end of September 2008
- TDWR Level II data collection and distribution uncertain due to funding;
- Product Central Collection & Distribution planned for early 2009
 - RPCCCDS Broadcast
 - Added to 10 second radar product bundles
 - Mix of WSR-88D RPG and TDWR SPG Products
 - Central Server Level III Transmit/Receive Status Web Page
 - Radar FTP Server
 - Products common to WSR-88D
 - Under existing product directories and in own radar id directory
 - New products (i.e., base products R/181, V/182, LR/186)
 - New product name directories and in own radar id directory



TDWR Level III Plans

TDWR SPG Product Collection



#	NNN	WMO	Radar Prod Code	Radar Product Name	Kbytes	Frequency	NWSTG Distribution	NWSTG RPCCDS FTP Dir Name
1	GSM	NXUS6i	2	General Status Message(GSM)	0.1	~ 5/day	RPCCDS & SBN	DS.p2gsm
2	FTM	NOUS6i	75	Free Text Message(FTM)	0.3	< 1/day	RPCCDS & SBN	DS.75ftm
3	RSL	SDUS4i	152	Archive Status Product(ASP)	3	3/day	RPCCDS & SBN	DS.152rs
4	TZL	SDUS5i	186	Reflectivity (Z) - 0.6 deg Long Range - 8bit	80	10/hr	RPCCDS & SBN	DS.186zl
5	TR0	SDUS5i	181	Reflectivity (Z) - Lowest elev - 4bit	25	10/hr	RPCCDS & SBN	DS.181r0
6	TR1	SDUS2i	181	Reflectivity (Z) - 1.0 deg - 4bit	14	10/hr	RPCCDS & SBN	DS.181r1
7	TR2	SDUS2i	181	Reflectivity (Z) - 3rd elev- 4bit	12	10/hr	RPCCDS & SBN	DS.181r2
8	TV0	SDUS5i	182	Velocity (V) - Lowest elev - 8bit	90	10/hr	RPCCDS & SBN	DS.182v0
9	TV1	SDUS7i	182	Velocity (V) - 1.0 deg - 8bit	70	10/hr	RPCCDS & SBN	DS.182v1
10	TV2	SDUS7i	182	Velocity (V) - 3rd elev - 8bit	45	10/hr	RPCCDS & SBN	DS.182v2
11	NCR	SDUS5i	37	Composite Ref (CZ)	20	10/hr	RPCCDS & SBN	DS.p37cr
12	NET	SDUS7i	41	Echo Tops (ET)	1.5	10/hr	RPCCDS & SBN	DS.p41et
13	NVW	SDUS3i	48	VAD Wind Profile (VWP)	7.5	10/hr	RPCCDS & SBN	DS.48vwp
14	NVL	SDUS5i	57	Vert Integ Liq (VIL)	1.3	10/hr	RPCCDS & SBN	DS.57vil
15	NST	SDUS6i	58	Storm Tracking Information (STI)	3.5	10/hr	RPCCDS	DS.58sti
16	NHI	SDUS6i	59	Hail Index (HI)	3.2	10/hr	RPCCDS	DS.p59hi
17	NTV	SDUS6i	61	Tornadic Vortex Signature (TVS)	2.1	10/hr	RPCCDS	DS.61tvs
18	N1P	SDUS3i	78	One Hour Precip (OHP)	10	10/hr	RPCCDS & SBN	DS.78ohp
19	NTP	SDUS5i	80	Storm Total Precip (STP)	11	10/hr	RPCCDS & SBN	DS.80stp
20	DPA	SDUS8i	81	Digital Precip Array (DPA)	7	10/hr	RPCCDS & SBN	DS.81dpr
21	SPD	SDUS6i	82	Supplemental Precipitation Data (SPD)	2.8	10/hr	RPCCDS	DS.82spd
22	DHR	SDUS5i	32	Digital Hybrid Scan Refl (DHR)	32	10/hr	RPCCDS & SBN	DS.32dhr
23	DSP	SDUS5i	138	Digital Storm Total Precip (STP)	15	10/hr	RPCCDS & SBN	DS.138dp
24	NMD	SDUS3i	141	Mesocyclone (MD)	2	10/hr	RPCCDS & SBN	DS.141md



TDWR Level III Plans

TDWR SPG IDs, Sending WFOs, FTP dir names

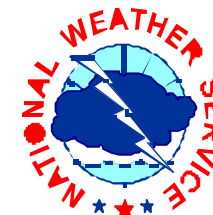


WFO #	SPGs @ wfo	Sending WFO ID CCCC	TDWR SPG ID xxx	TDWR SPG ID	Radar FTP Site directory	SPG #	WFO #	SPGs @ wfo	Sending WFO ID CCCC	TDWR SPG ID xxx	TDWR SPG ID	Radar FTP Site directory	SPG #
1	1	KBOU	DEN	3013	Sl.tden	1	17	4	KLWX	ADW	3001	Sl.tadw	22
2	1	KBOX	BOS	3004	Sl.tbos	2			KLWX	BWI	3005	Sl.tbwi	23
3	1	KCLE	LVE	3006	Sl.tlve	3			KLWX	DCA	3012	Sl.tdca	24
4	1	KDTX	DTW	3015	Sl.tdtw	4			KLWX	IAD	3019	Sl.tiad	25
5	1	KEAX	MCI	3025	Sl.tmci	5	18	1	KMEG	MEM	3028	Sl.tmem	26
6	1	KFFC	ATL	3002	Sl.tatl	6	19	3	KMFL	FLL	3017	Sl.tfll	27
7	2	KFWD	DAL	3010	Sl.tdal	7			KMFL	MIA	3029	Sl.tmia	28
		KFWD	DFW	3014	Sl.tdfw	8			KMFL	PBI	3035	Sl.tpbi	29
8	1	KGSP	CLT	3007	Sl.tclt	9	20	1	KMKX	MKE	3030	Sl.tmke	30
9	2	KHGX	HOU	3018	Sl.thou	10	21	1	KMLB	MCO	3026	Sl.tmco	31
		KHGX	IAH	3020	Sl.tiah	11	22	1	KMPX	MSP	3031	Sl.tmsp	32
10	1	KICT	ICH	3021	Sl.tich	12	23	1	KOHX	BNA	3003	Sl.tbna	33
11	3	KILN	CMH	3008	Sl.tcmh	13	24	2	KOKX	EWR	3016	Sl.tewr	34
		KILN	CVG	3009	Sl.tcvg	14			KOKX	JFK	3023	Sl.tjfk	35
		KILN	DAY	3011	Sl.tday	15	25	1	KOUN	OKC	3033	Sl.tokc	36
12	1	KIND	IDS	3022	Sl.tids	16	26	1	KPBZ	PIT	3038	Sl.tpit	37
13	1	KLIX	MSY	3032	Sl.tmsy	17	27	1	KPHI	PHL	3036	Sl.tphl	38
14	1	KLMK	SDF	3040	Sl.tsdf	18	28	1	KPSR	PHX	3037	Sl.tphx	39
15	2	KLOT	MDW	3027	Sl.tmdw	19	29	1	KRAH	RDU	3039	Sl.trdu	40
		KLOT	ORD	3034	Sl.tord	20	30	1	KSLC	SLC	3042	Sl.tslc	41
16	1	KLSX	STL	3043	Sl.tstl	21	31	1	KTBW	TPA	3044	Sl.ttpa	42
							32	1	KTSA	TUL	3045	Sl.ttul	43
							33	1	KVEF	LAS	3024	Sl.tlas	44
							34	1	TJSJ	SJU	3041	Sl.tsju	45

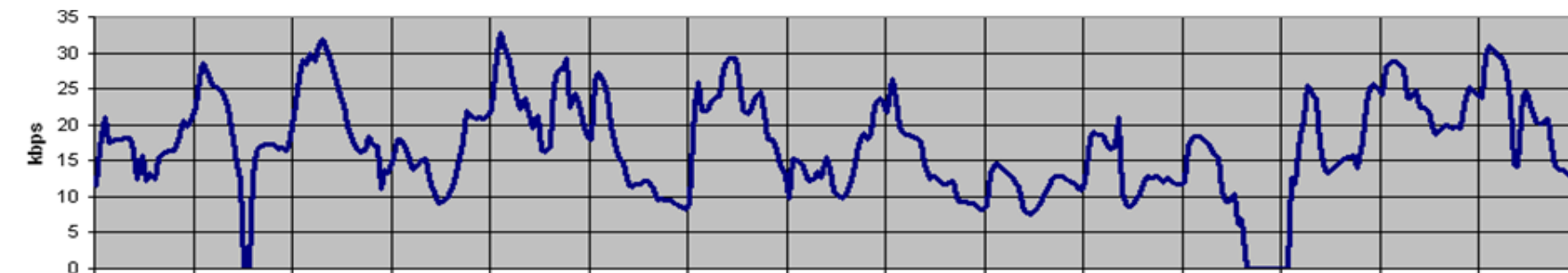


TDWR Level III Plans

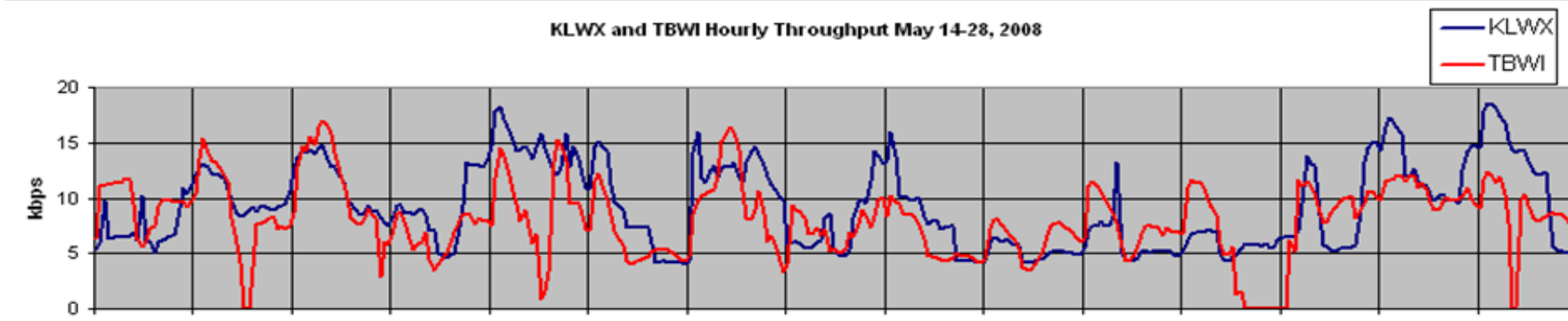
Product Throughput per Radar



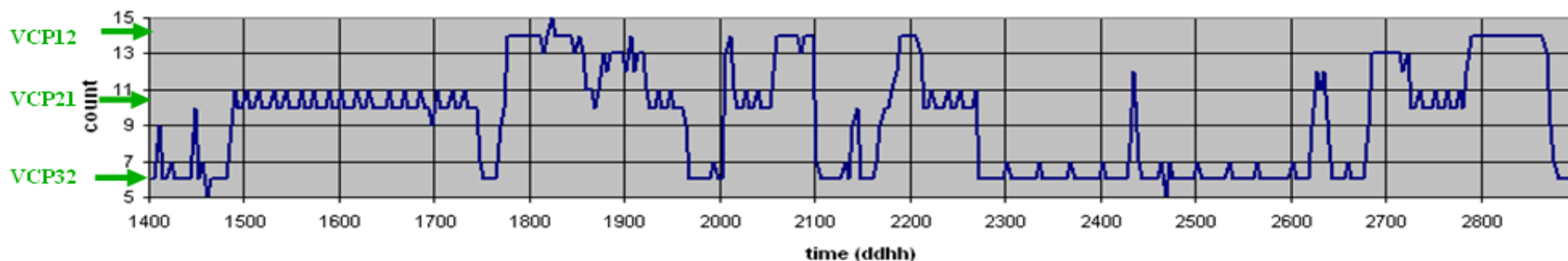
Total Hourly Throughput from KLWX and TBWI May 14-28, 2008



KLWX and TBWI Hourly Throughput May 14-28, 2008



LWX OHP/78 (IHP) Product Count per Hour May 14-28, 2008





TDWR Level III Plans Implementation and Impacts



- To evaluate the impact on communications and data storage systems, implementation will be phased and evaluated by those responsible for respective systems.
- The phases and planned start dates are:
 - **November** 2008: AWIPS OB9 beta test (1 – 8 sites),
 - **February** 2009: AWIPS OB9 Deployment (up to 15 sites),
 - **March** 2009: AWIPS OB9 Deployment (up to 30 sites),
 - **June** 2009: Full Implementation (45 sites).
- May 14-28, 2008 tbwi ranged from 4 to 16 kbps (average 8.5 kbps).
- High utilization can occur during clear air since the short-range high-res TDWR radar products tend to be full and have high texture.
- Products are zlib compressed before being put on the SBN, so the total SBN load of 45 radars is estimated to be below 225 kbps



Additional Information



- Project updates and other Level II information:
 - http://www.roc.noaa.gov/NWS_Level_2
- NWS Real-Time WSR-88D Transmit/Receive Status:
 - <http://weather.noaa.gov/monitor/radar/>
- NWS Real-Time Level II Data Monitoring Site:
 - <http://weather.noaa.gov/monitor/radar2/>
- WSR-88D Software/Program updates for product users:
 - <http://www.nws.noaa.gov/tg/rpcds.html>
- Build specific training materials:
 - <http://www.wdtb.noaa.gov/>



Additional Information

(Continued)

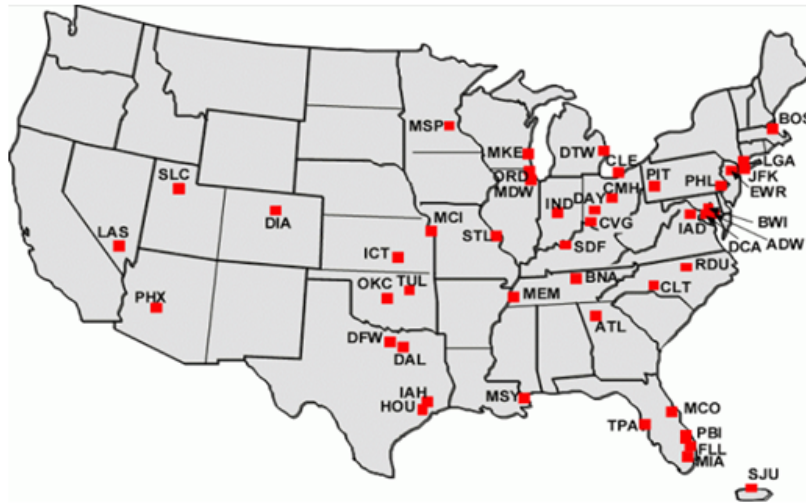


- NCDC Radar Resources: Order Level II and Level III Archive Data Via FTP, Use NCDC Java Viewer to View Level II and Level III Archive Data, etc.
 - <http://www.ncdc.noaa.gov/oa/radar/radarresources.html>
- Run RPG Software, LINUX Platform: The Common Operations and Development Environment (CODE)
 - <http://www.weather.gov/CODE88D>
- Federal Meteorological Handbook No. 11 (FMH-11) Part A Updated for Build 10 will be available electronically in July
 - <http://www.ofcm.gov/homepage/text/pubs.htm>
- Follow-up questions to: Michael.Istok@noaa.gov or Tim.D.Crum@noaa.gov



TDWR Level III Plans – Backup Slide

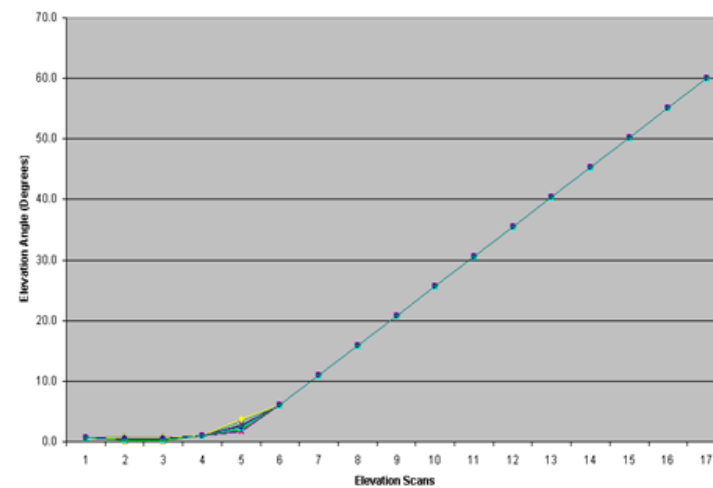
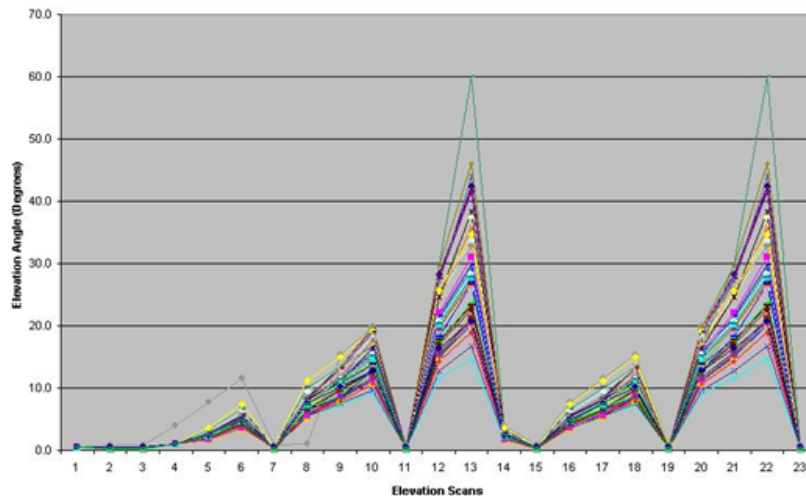
TDWR System Overview



Comparison of 45 TDWR Scan Strategies - Hazardous Mode

Antenna	
Peak Power	250 KW
Beam Width	0.55 Degrees
Power Gain	50 dB
Minimum Elevation	0 Degrees
Maximum Elevation	60 Degrees
Maximum Rotation Rate	5 RPM
Transmitter	
Frequency	C Band
Wavelength	5.3 cm
Pulse Width	1.1 msec
Polarization	Linear Horizontal
Max. Reflectivity Range	460 km
Min Unambiguous Doppler Range	90 km
Maximum Doppler Range	90 km
Range Resolution	150 m (out to 135 km)
(Reflectivity)	300 m (135 km - 460)
Doppler Range Resolution	150 m

Comparison of 45 TDWR Scan Strategies - Monitor Mode





TDWR Level III Plans – Backup Slide Differences from WSR-88D



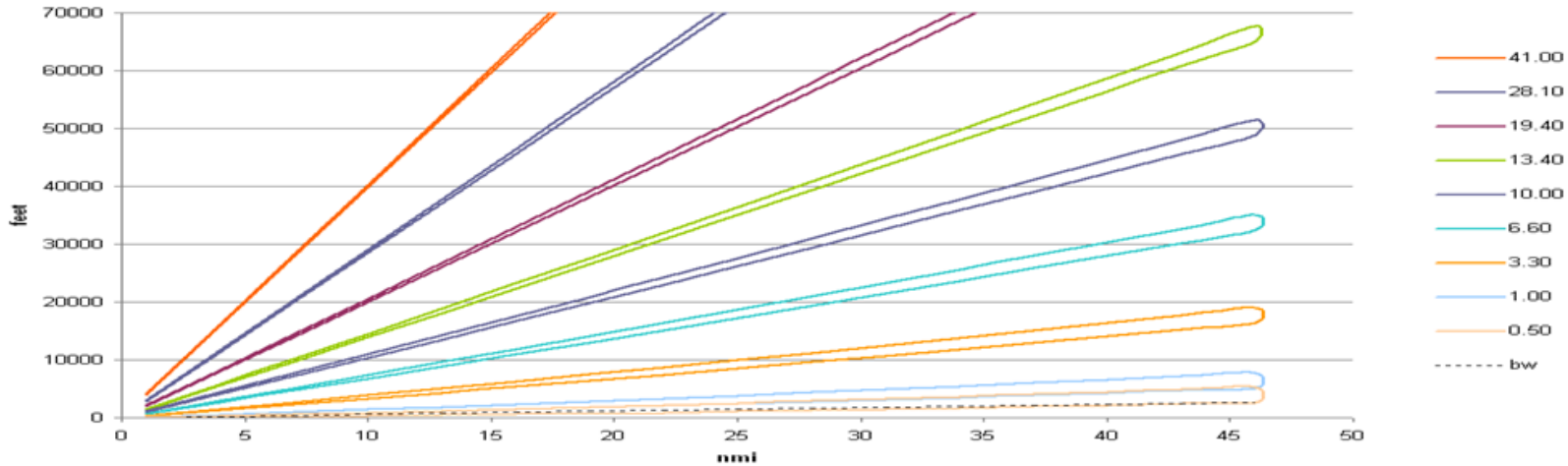
- TDWR is C-band
 - Significant Attenuation at times
 - More range and velocity folding
- Aggressive clutter filtering
- WSR-88D beamwidth is 1 degree, whereas TDWR is ½ degree
 - TDWR computes radial data at 1 degree azimuths, but still vertically narrow
- Scan Strategies / Volume Coverage Patterns (VCP)
 - TDWR scan strategy elevation angles are site specific
 - Higher elevation angles and larger intervals between elevations
 - SPG translates TDWR Hazardous and Monitor modes to VCP 80 and 90, respectively. Both are 6 minutes in duration.
 - Some elevations angles in VCP 80 repeat during the volume scan
- TDWR Spatial resolution and coverage area provided by SPG
 - Long range surveillance scan is at 300m resolution to 225 nmi range
 - All other elevations are at 150m resolution and extend to 45 nmi
 - Product range is 45nmi, except for rainfall products, and long range base Refl
 - SPG product VS time varies within a volume to distinguish product repeats



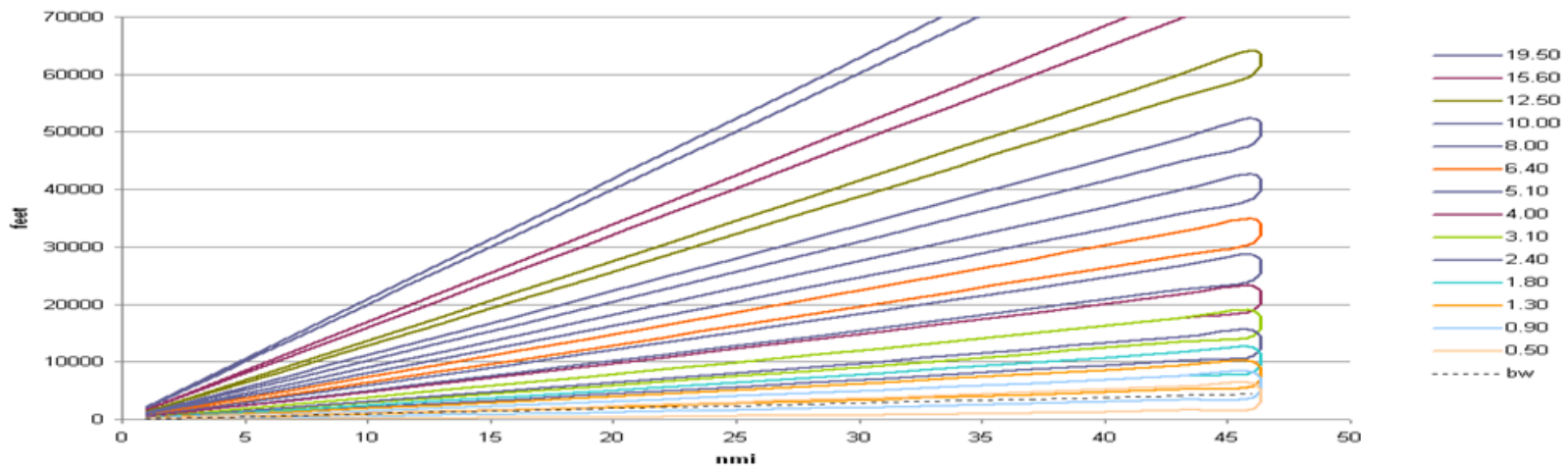
TDWR Level III Plans – Backup Slide VCP Elevation Scan Coverage Comparison



VCP80 (tbw) Range-Height Beam Coverage



VCP12 (WSR-88D) Range-Height Beam Coverage





TDWR Level III Plans – Backup Slide

TDWR SPG Algorithm/Product Processing



Tilt #	AWIPS Menu	Angle		VCP		TDWR SPG (Product Time)									
		Min	Max	90	80	2200	2200	2206	2207	2208	2209	2210	2211	2212	
25	60.0	57.6	62.5	60.0			16								
24	55.0	52.6	57.5	55.1			15								
23	50.0	47.6	52.5	50.2			14								
22	45.0	42.6	47.5	45.3			13								
21	40.0	37.6	42.5	40.4	42.0		12			12			21		
20	35.0	32.6	37.5	35.5			11			11			20		
19	30.0	27.6	32.5	30.6	28.1		10								
18	25.0	22.1	27.5	25.7			9								
17	19.5	18.0	22.0	20.8	19.4		8			9				19	
16	16.7	15.7	17.9	15.9			7								
15	14.0	13.1	15.6		13.4					8				17	
13	10.0	9.6	11.0	11.0	10.0		6			7				16	
10	6.0	5.7	6.6	6.1	6.6		5							15	
7	3.4	2.7	3.6	3.3	3.3		4							13	
3	0.9	0.8	1.1	1.0	1.0		3							3 R	
2	0.5	0.4	0.7	0.6	0.6	1		1						1 R	
2	0.5	0.4	0.7	0.5	0.5		2			2	6	10	14	18	22
AWIPS Binning Scheme				bwi		90			80						
tbwi example				VNUM		1			2						

Algorithms/Products run on scans as indicated by cell side boarder (1 per 6 minute PPS, ULR, VWP), top (derived mini-vol), and patterns (storm analysis mini-volume).

- PPS: Long Range Cut
- VWP: Last Cut of Each Short Range Angle
- ULR: Every Cut
- STI, HI, MD, TVS, cat: Cut #'s as noted & reuse
- 1.0 deg cut
- CR, VIL, ET: Cut #'s as noted & reuse 1.0 deg and Long Range cut
- 1

Product Times (top) of Base Product Elevation Cuts indicated by cell color