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SUBJECT: Responds to NRC Bulletin 90-002, "Loss of Thermal Margin  
Caused by Channel Box Bow," effect on Cycle 8 Operation.

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February 25, 1992  
G02-92-048

Docket No. 50-397

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555

Subject: WNP-2, OPERATING LICENSE NPF-21  
RESPONSE TO NRC BULLETIN NO. 90-02; "LOSS OF  
THERMAL MARGIN CAUSED BY CHANNEL BOX BOW",  
EFFECT ON CYCLE 8 OPERATION

- References:
1. NRC Bulletin No. 90-02, March 20, 1990, "Loss of Thermal Margin Caused by Channel Box Bow"
  2. G02-90-075, April 13, 1990, GC Sorensen to US NRC, "Modification to WNP-2 Cycle 6 Reload Submittal and Response to NRC Bulletin No. 90-02: Loss of Thermal Margin Caused by Channel Box Bow"
  3. ANF-524(P)(A), Rev. 2, Supplements 1 and 2, November 1990, "Advanced Nuclear Fuels Corporation Critical Power Methodology for Boiling Water Reactors"
  4. G02-90-162, September 28, 1990, GC Sorensen to US NRC, "Final Response to NRC Bulletin No. 90-02: Loss of Thermal Margin Caused by Channel Box Bow"
  5. G02-91-037, February 25, 1991, GC Sorensen to US NRC, "Request for Additional Information Regarding NRC Bulletin 90-02, Loss of Thermal Margin Caused by Channel Box Bow"
  6. Letter, April 22, 1991, PL Eng (NRC) to GC Sorensen "Evaluation of Response to NRC Bulletin NO. 90-02, Loss of Thermal Margin Caused by Channel Box Bow (TAC NO. 76354)"

Reference 1 requested that licensees reusing channel boxes verify that current Minimum Critical Power Ratio (MCPR) Technical Specification operating and safety limits are met. All affected licensees were requested to advise the NRC of the number of such channel boxes, their location within the core and to describe the methods and associated data base used to account for the effects of channel box bow during reuse of channel boxes to ensure conformance with the CPR limits.

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The Supply System responded to this bulletin in References 2, 4 and 5. Reference 6 provided WNP-2 the NRC evaluation of the issues for Cycle 7. It also required that the reuse of channel boxes in future cycles be evaluated on a cycle specific bases. This letter responds to those requirements for WNP-2 Cycle 8. The effect of potential channel box bow on CPR limits was evaluated in the Cycle 8 design.

In Cycle 7, 349 of the 764 channels in the WNP-2 core were reused channels. In Cycle 8, there will be 291 reused channels. The Supply System channel management program is in a transitional process to eliminate the reused channels from the WNP-2 core. In support of this goal, the Supply System will discharge channels predicted to achieve a target exposure of approximately 50 GWD/MTU or perform an analysis to justify the continued use. Reference 4 discusses the basis for the selection of the exposure target. At the end of Cycle 8, reused channel exposure is predicted to be less than 49 GWD/MTU. The following represents the exposure distribution of the 291 channels for the beginning of Cycle 8.

<u>EXPOSURE RANGE</u> <u>(GWD/MTU)</u>	<u>QUANTITY</u>
15 - 25	13
25 - 35	134
35 - 45	144

WNP-2, a C-lattice BWR, is less susceptible than a D-lattice BWR to the phenomena of and effects from channel box bow. The Supply System, aware of the potential problems associated with channel box bow, has had a channel management program in place since initial operation of WNP-2. The WNP-2 channel management program consists of data collection on channel operating history and actual measurement of channel distortion as a function of channel operation. As stated above, the current goal of this program is to use a channel box for a single assembly lifetime.

Beginning with Cycle 7, the effects of channel box bow were addressed in WNP-2 reload design using the approved Siemens Nuclear Power Corporation (SNP) methodology for determining the Safety Limit Critical Power Ratio (SLCPR) (Reference 3). The SNP data incorporated in the SNP methodology has been reviewed previously by the NRC (including WNP-2 measured data) and along with the methodology has been approved by the NRC (Reference 3). The SLCPR established for Cycle 8 operation of WNP-2 will include the effects of channel box bow as analyzed by this methodology.

During Cycle 8, 291 reused channels will be in the WNP-2 core. The planned location coordinates for each reused channel for Cycle 8 are given in Table 1. The location of each reused channel is also indicated on the attached core map (Figure 1) by assembly number. The appropriate channel number for each assembly number can be determined from Table 1. A total of 153 of the reused channels will be located face adjacent to new fuel assemblies. Given the number of reused channels, it is likely that a reused channel will be adjacent to a limiting assembly during Cycle 8. The precise location of limiting assemblies during Cycle 8 will be dependent upon the actual operating experience. Experience has

Page Three

RESPONSE TO NRC BULLETIN NO. 90-02; "LOSS OF THERMAL MARGIN  
CAUSED BY CHANNEL BOX BOW", EFFECT ON CYCLE 8 OPERATION

shown that limiting assemblies are almost always once burned assemblies and, potentially at the end of a long cycle, fresh assemblies can be limiting. It is therefore likely that a reused channel could be adjacent to a limiting assembly at some time during Cycle 8 operation. This probability is recognized and taken into account in calculation of the SLCPR using the SNP methodology.

Channel distortion (bow + bulge) magnitude and direction is directly dependent upon the location history of the channels. The channels that will have the largest estimated exposure at end of cycle are channels 71400 and 72036. The channels will reside in core location 15,23 and 16,8 respectively (row and column coordinates from the upper left corner as shown in Figure 1). The Supply System analytical model predicts a maximum calculated total distortion for these channels to be less than 105 mils. Exposures for the other reused channels in WNP-2 shown in Table 1 are predicted to be less than this value.

The anticipated effect of maximum channel distortion is accounted for in the MCPR operating limit by modification of the SLCPR which is a part of the MCPR operating limit. The WNP-2 SLCPR is established through statistical consideration of measurement and calculational uncertainties associated with the thermal hydraulic state of the reactor using design basis radial, axial and local power distributions and considering fuel channel bow. Reference 3 discusses SNP MCPR safety limit methodology and describes in detail how channel bow effects are incorporated into the MCPR safety limit. The effects of channel bow increase the WNP-2 Cycle 8 MCPR safety limit by about 0.02.

Sincerely,



G. C. Sorensen, Manager  
Regulatory Programs (Mail Drop 280)

MGE/BMM/bk

Attachments: 1) Table 1; Reused channels, assemblies and projected exposure  
2) Figure 1; Cycle 8 load pattern showing assemblies with reused channels

cc: JB Martin - NRC RV  
NS Reynolds - Winston & Strawn  
PL Eng - NRC  
DL Williams - BPA/399  
NRC Site Inspector - 901A

TABLE 1

## REUSED CHANNELS, ASSEMBLIES, AND PROJECTED EOC 8 EXPOSURES

X	Y	CURRENT ASSEMBLY	CHANNEL ID	PROJ. EOC 8 EXPOSURE
===	===	=====	=====	=====
1	18	XN2097	62446	42391
2	12	UD5071	71938	33382
2	15	UD4034	72009	38735
3	19	XN2108	73379	37864
3	8	AN3066	73366	43619
3	9	AN3092	63572	39917
3	11	AN3043	6450D	35431
3	15	UD4032	72010	46474
3	20	AN3083	71809	44102
3	22	AN3089	62513	40004
3	23	AN3095	5938D	37102
4	7	AN3064	72035	39776
4	10	UD5066	71780	38699
4	13	AN3068	70287	45574
4	15	UD4115	71785	45692
4	18	AN3096	70257	45274
4	24	AN3028	72474	39592
5	9	UD5064	71198	41253
5	10	AN3040	73367	45599
5	12	UD5069	63492	41963
5	14	UD4025	70279	41249
5	21	AN3126	71933	48030
5	24	UD4029	73090	45241
6	3	XN2027	73412	34693
6	5	AN3133	71927	44212
6	11	XN2106	73168	36347
6	15	XN2091	71387	36106
6	16	XN2099	61638	42613
6	20	XN2080	72003	36326
6	26	AN3134	73384	43425
7	3	XN2026	73375	42089
7	10	XN2046	71370	37697
7	11	AN3074	73425	44210
7	14	AN3042	71970	47995
7	17	AN3025	63257	47897
7	20	AN3090	73390	44283
7	27	AN3124	71376	39746
8	3	AN3054	63427	45394
8	6	UD5030	71848	40819
8	15	AN3075	73079	48235
8	16	AN3107	71808	45469
8	25	UD5035	71983	40424
8	28	AN3082	71447	33820
9	1	XN1160	72475	37409
9	3	AN3104	72039	42632



TABLE 1 (CONT.)

X	Y	CURRENT ASSEMBLY	CHANNEL ID	PROJ. EOC 8 EXPOSURE
===	===	=====	=====	=====
9	11	AN3099	71956	47682
9	14	AN3067	61769	47264
9	17	AN3098	5900D	38500
9	20	AN3045	71914	48174
9	28	AN3085	73394	41930
10	5	AN3038	71756	47999
10	7	XN2022	71461	38236
10	9	UD5072	70238	41896
10	11	UD5070	71945	41823
10	13	AN3033	73130	46830
10	15	AN3039	71789	43353
10	16	AN3125	71755	43207
10	18	AN3021	71458	46826
10	24	XN2096	71472	38198
10	26	AN3130	6012D	36473
11	1	XN2047	73584	44354
11	3	AN3031	71389	44455
11	6	XN2085	71762	36534
11	7	AN3053	5898D	35765
11	9	AN3051	63949	47360
11	15	AN3036	63602	45087
11	16	AN3008	71758	45024
11	22	AN3119	63442	47403
11	24	AN3103	73154	35751
11	25	XN2101	73438	36091
11	28	AN3029	72439	43916
12	13	UD5063	71817	42062
12	15	AN3070	5881D	34632
12	16	AN3027	71437	42993
12	26	UD5013	70110	41791
13	1	XN2023	73401	36189
13	3	UD5065	61550	36358
13	4	AN3034	71757	45300
13	10	AN3032	71942	44832
13	14	AN3035	71986	42940
13	17	AN3007	5960D	34219
13	21	AN3030	71443	44968
13	27	AN3022	72027	47303
13	30	XN2109	73424	43440
14	7	AN3100	73120	46930
14	9	AN3052	71958	46585
14	13	AN3041	73108	42573
14	15	XN2087	71965	39498
14	16	XN2095	70104	39529
14	18	AN3026	72001	43029
14	22	AN3120	73226	47051
14	24	AN3049	72024	46925

TABLE 1 (CONT.)

X	Y	CURRENT ASSEMBLY	CHANNEL ID	PROJ. EOC 8 EXPOSURE
====	====	=====	=====	=====
14	26	UD4031	72038	42157
15	4	UD4024	62926	45710
15	6	XN2086	71300	36416
15	8	AN3076	5809D	39723
15	10	AN3069	73116	43605
15	11	AN3080	5866D	36884
15	12	AN3079	63445	43405
15	14	XN2084	71936	39745
15	17	XN2067	73582	40074
15	19	AN3084	71391	45903
15	20	AN3001	71790	45826
15	21	AN3081	73111	34651
15	23	AN3097	71400	48383
15	25	XN2094	71761	35853
15	27	UD4022	73386	34357
16	1	XN2104	71146	43618
16	6	XN2056	72023	42091
16	7	UD4143	72042	29307
16	8	AN3073	72036	48383
16	11	AN3002	62283	36964
16	12	AN3128	72021	43853
16	14	XN2066	61972	33281
16	17	XN2100	71959	33361
16	19	AN3016	71448	43364
16	20	AN3122	71928	42882
16	21	AN3023	5850D	34634
16	23	AN3116	63947	48355
16	24	UD4140	73083	47175
16	25	XN2068	61682	42683
16	30	XN2092	71810	36797
17	1	XN2123	71465	36008
17	7	AN3086	70047	44477
17	9	AN3019	71852	47424
17	13	AN3020	63956	43438
17	15	XN2065	71921	33044
17	16	XN2052	61526	33023
17	18	AN3060	71268	43275
17	19	UD5033	70158	42485
17	22	AN3063	62937	47216
17	24	AN3091	73112	46926
17	29	UD5026	61750	40143
17	30	XN2054	71767	35734
18	2	UD5040	62522	40022
18	4	AN3011	60890	48137
18	9	UD5010	72034	40378
18	10	AN3123	71991	46932
18	11	XN2048	5924D	33453



TABLE 1 (CONT.)

X	Y	CURRENT ASSEMBLY	CHANNEL ID	PROJ. EOC 8 EXPOSURE
====	====	=====	=====	=====
18	14	AN3056	61741	43093
18	17	AN3078	71967	43281
18	21	AN3048	70272	44832
18	22	UD5024	61529	40153
18	27	AN3061	73399	47936
18	28	UD5021	71799	38886
19	1	XN2105	61650	36142
19	4	UD4021	73232	43031
19	7	UD4033	72007	48334
19	8	UD4016	71904	29855
19	9	UD5039	70011	39416
19	11	UD4005	73089	30030
19	14	UD5009	71913	42912
19	15	AN3131	72041	43330
19	16	AN3121	71444	43588
19	20	UD4014	71853	47883
19	22	UD5031	73415	39525
19	23	UD4139	61794	48030
19	24	UD4023	73614	36573
19	27	UD4003	63953	43031
19	29	UD5029	61773	40043
19	30	XN2039	71194	36594
20	3	AN3044	73422	44451
20	6	XN2055	71134	36784
20	7	AN3057	5802D	35752
20	9	AN3013	71838	47332
20	12	UD4015	5912D	30329
20	13	XN2050	71934	37325
20	15	AN3014	71985	45146
20	16	AN3015	72014	45241
20	18	XN2076	73405	37537
20	19	UD4013	71289	48249
20	22	AN3005	73153	47269
20	24	AN3111	73135	44311
20	25	XN2051	70280	43007
20	28	AN3047	73133	41808
20	29	UD5023	73069	41979
21	1	XN2102	62711	43296
21	2	UD4042	71943	43938
21	7	XN2040	71302	38236
21	9	UD5011	71930	41622
21	11	UD5017	63943	41808
21	13	AN3132	71981	46968
21	15	AN3055	73171	43710
21	16	AN3077	71812	43293
21	18	AN3024	71445	47123
21	26	AN3006	71912	48123

TABLE 1 (CONT.)

X	Y	CURRENT ASSEMBLY	CHANNEL ID	PROJ. EOC 8 EXPOSURE
====	====	=====	=====	=====
21	29	UD4135	71975	41428
21	30	XN2038	71371	36830
22	1	XN2037	71170	34612
22	3	AN3050	71449	31145
22	7	UD5036	73238	39541
22	9	XN2005	71495	40064
22	10	UD5008	71377	42474
22	11	AN3101	61523	48008
22	12	UD5014	71759	39889
22	13	UD5004	71908	41079
22	14	AN3072	71788	47103
22	17	AN3110	71773	46953
22	20	AN3108	71994	47876
22	24	UD5022	70252	39681
22	28	AN3093	73420	42624
22	30	XN2083	71843	34461
23	3	AN3058	73388	45273
23	7	UD4144	62335	47266
23	8	UD4012	71950	29442
23	11	UD4137	70221	48333
23	12	UD4028	73110	48188
23	15	AN3071	73131	36526
23	16	AN3115	73227	48132
23	20	UD4141	63940	48264
23	23	UD4134	71903	47513
23	24	UD4142	6028D	32169
23	28	AN3112	71990	44955
24	3	XN2061	61970	24955
24	4	AN3037	72037	39652
24	5	UD4116	71764	44744
24	7	UD4039	71835	28415
24	8	UD4027	70233	47046
24	9	UD5016	71356	39772
24	11	AN3087	61578	43965
24	12	UD4026	71467	47937
24	13	UD4041	71923	30184
24	14	AN3127	70102	47896
24	15	UD4040	71786	28980
24	16	UD4035	71957	44568
24	17	AN3062	71890	47890
24	18	UD4036	73441	30687
24	19	UD4037	70106	46374
24	20	AN3105	70206	43741
24	22	UD5037	71830	39948
24	23	UD4008	73148	47338
24	24	UD4007	62647	44932
24	26	UD4004	73444	33795

TABLE 1 (CONT.)

X	Y	CURRENT ASSEMBLY	CHANNEL ID	PROJ. EOC 8 EXPOSURE
=====	=====	=====	=====	=====
24	27	AN3129	71442	39437
24	28	XN2064	73239	35685
25	3	XN2041	73392	41585
25	4	XN2122	71280	37025
25	5	AN3102	71753	35158
25	6	UD4138	71485	47047
25	8	UD5018	61538	40654
25	11	XN2098	73364	43227
25	13	XN2075	71886	45177
25	15	XN2081	71390	36106
25	16	XN2078	61673	42308
25	18	XN2057	71909	33684
25	20	XN2090	62699	37055
25	25	UD4136	62412	46918
25	26	AN3065	71976	37911
25	27	XN2082	71893	36303
26	5	XN2089	73376	36296
26	12	UD5028	71962	41329
26	19	UD5025	71141	42010
26	21	AN3017	73139	48039
26	26	XN2069	71905	37187
27	7	AN3018	71431	39366
27	8	UD4038	73403	26649
27	13	AN3113	HA5422	47311
27	15	UD4011	71792	27123
27	16	UD4132	73167	45702
27	18	AN3109	73121	47733
27	19	UD4030	71308	43038
27	21	UD5034	71771	39644
27	23	UD4083	72017	44679
28	6	XN2049	71857	34013
28	7	XN2103	71331	36057
28	8	AN3114	5805D	34401
28	9	AN3088	5905D	31163
28	11	AN3012	5999D	35398
28	15	UD4006	71954	28444
28	20	AN3059	5868D	32739
28	22	AN3094	5852D	33885
28	23	AN3106	5932D	37232
28	24	XN2043	71910	35300
28	25	XN2001	72012	33985
29	9	XN2073	71964	37865
29	12	UD5020	71791	39788
29	18	UD5038	71960	40501
29	20	UD5032	70243	39675
29	22	XN2060	73416	30916
30	9	XN2058	73076	42440

TABLE 1 (CONT.)

X	Y	CURRENT ASSEMBLY	CHANNEL ID	PROJ. EOC 8 EXPOSURE
===	===	=====	=====	=====
30	10	XN2111	63951	42925
30	11	XN2088	72476	36664
30	12	XN2110	73588	36280
30	13	XN2072	73440	34799
30	14	XN2028	73383	41556
30	17	XN2036	61541	41077
30	18	XN2059	71765	42518
30	19	XN2042	61727	36030
30	20	XN2107	73224	43004
30	21	XN2093	72040	36241
30	22	XN2074	71949	36046

Figure 1  
Cycle 8 Load Pattern Showing Assemblies with Reused Channels

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1									XN1154	XN2134	XN2115	XN2114	XN2045	XN2129	XN2006
2								XN1039	XN2025	UD4018	UD5124	UD5071*	UD5128	UD5093	UD4034*
3						XN2124	XN2132	AN3066*	AN3092*	WA6003	AN3043*	UD6059	UD5125	UD6061	UD4032*
4						XN2121	AN3064*	UD4045	UD6113	UD5066*	AN7	UD4051	AN3068*	AN7	UD4115*
5					XN2127	UD4146	UD4052	AN7	UD5064*	AN3040*	UD6087	UD5069*	UD6038	UD4025*	UD6069
6			XN2027*	XN1065	AN3133*	UD4112	UD6028	UD5122	UD6120	AN7	XN2106*	UD6013	XN1074	AN7	XN2091*
7			XN2026*	AN3046	UD4118	UD6036	UD4099	UD4107	UD5057	XN2046*	AN3074*	UD4108	UD4100	AN3042*	UD4103
8		XN1100	AN3054*	UD4128	AN7	UD5030*	UD4113	UD4104	UD5005	AN7	UD4114	UD4082	UD6108	AN7	AN3075*
9	XN1160*	XN2024	AN3104*	UD6058	LYV153	UD6112	UD5056	UD5007	XN1150	UD5061	AN3099*	UD5062	UD5131	AN3067*	UD6026
10	XN2126	UD4111	UD5111	UD5127	AN3038*	AN7	XN2022*	AN7	UD5072*	UD6054	UD5070*	AN7	AN3033*	UD6068	AN3039*
11	XN2047*	UD5121	AN3031*	AN7	UD6037	XN2085*	UD4017	AN3051*	UD5135	UD4046	UD4048	XN2125	AN7	AN3036*	
12	XN2007	UD5129	UD6114	UD4088	UD5087	UD6060	UD4117	UD4062*	UD5055	AN7	UD4047	UD4053	UD5063*	UD5058	AN3070*
13	XN2023*	UD5130	UD5065*	AN3034*	UD6052	XN2003	UD4043	UD6103	UD5123	AN3032*	XN1135	UD5132	UD6056	AN3035*	UD6039
14	XN1146	UD5054	UD6062	AN7	UD4121	AN7	AN3100*	AN7	AN3052*	UD6041	AN7	UD5126	AN3041*	AN7	XN2087*
15	XN2130	UD4122	UD4054	UD4024*	UD6057	XN2086*	UD4061	AN3076*	UD6094	AN3069*	AN3080*	AN3079*	UD6115	XN2084*	UD4044
16	XN2104*	UD4071	UD4097	UD4076	UD6078	XN2056*	UD4143*	AN3073*	UD6117	AN3010	AN3002*	AN3128*	UD6002	XN2066*	UD4098
17	XN2123*	UD5075	UD6021	AN7	UD4072	AN7	AN3086*	AN7	AN3019*	UD6015	AN7	UD5094	AN3020*	AN7	XN2065*
18	XN2116	UD5040*	UD5095	AN3011*	UD6079	XN1137	UD4101	UD6022	UD5010*	AN3123*	XN2048*	UD5103	UD6072	AN3056*	UD6018
19	XN2105*	UD5078	UD6012	UD4021*	UD5134	UD6080	UD4033*	UD4016*	UD5039*	AN7	UD4005*	UD4095	UD5084	UD5009*	AN3131*
20	XN2118	UD5085	AN3044*	AN7	UD6100	XN2055*	AN3057*	UD4077	AN3013*	UD5102	UD4102	UD4015*	XN2050*	AN7	AN3014*
21	XN2102*	UD4042*	UD5086	UD5080	AN3009	AN7	XN2040*	AN7	UD5011*	UD6067	UD5017*	AN7	AN3132*	UD6055	AN3055*
22	XN2037*	XN2071	AN3050*	UD6077	LYV156	UD6001	UD5036*	UD5019	XN2005*	UD5008*	AN3101*	UD5014*	UD5004*	AN3072*	UD6102
23		XN1066	AN3058*	UD4131	AN7	UD5042	UD4144*	UD4012*	UD5003	AN7	UD4137*	UD4028*	UD6016	AN7	AN3071*
24			XN2061*	AN3037*	UD4116*	UD6034	UD4039*	UD4027*	UD5016*	XN2119	AN3087*	UD4026*	UD4041*	AN3127*	UD4040*
25			XN2041*	XN2122*	AN3102*	UD4138*	UD6035	UD5018*	UD6017	AN7	XN2098*	UD6071	XN2075*	AN7	XN2081*
26					XN2089*	UD4145	UD4091	AN7	UD5076	AN3118	UD6105	UD5028*	UD6014	UD4087	UD6070
27						XN2112	AN3018*	UD4038*	UD6073	UD5082	AN7	UD4092	AN3113*	AN7	UD4011*
28						XN2049*	XN2103*	AN3114*	AN3088*	WA6001	AN3012*	UD6076	UD5079	UD6029	UD4006*
29								XN1124	XN2073*	UD4078	UD5081	UD5020*	UD5077	UD5120	UD4094
30									XN2058*	XN2111*	XN2088*	XN2110*	XN2072*	XN2028*	XN1153
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	XN2031	XN1106	XN2097*	XN1161	XN1110	XN1143	XN2044								
2	UD4059	UD5083	UD5068	UD5043	UD5052	UD4058	XN2108*	XN1037							
3	UD4055	UD6064	UD5108	UD6050	AN3083*	WA6004	AN3089*	AN3095*	XN1140	XN2034					
4	UD4105	AN7	AN3096*	UD4065	AN7	UD5115	UD6119	UD4020	AN3028*	XN1092					
5	UD6063	UD4073	UD6065	UD5112	UD6010	AN3126*	UD5073	AN7	UD4029*	UD4147	XN1144				
6	XN2099*	AN7	XN2016	UD6047	XN2080*	AN7	UD6101	UD5116	UD6049	UD4109	AN3134*	XN2032	XN2010		
7	UD4119	AN3025*	UD4001	UD4124	AN3090*	XN2009	UD5041	UD4129	UD4120	UD6104	UD4126	AN3124*	XN2035		
8	AN3107*	AN7	UD6042	UD4093	UD4127	AN7	UD5015	UD4106	UD4050	UD5035*	AN7	UD4130	AN3082*	XN1101	
9	UD6020	AN3098*	UD5117	UD5045	AN3045*	UD5044	XN2015	UD5012	UD5074	UD6099	LYV155	UD6109	AN3085*	XN1090	XN2033
10	AN3125*	UD6019	AN3021*	AN7	UD5050	UD6046	UD5091	AN7	XN2096*	AN7	AN3130*	UD5113	UD5133	UD4110	XN1138
11	AN3008*	AN7	XN2020	UD4010	UD4057	UD5046	AN3119*	UD4066	AN3103*	XN2101*	UD6011	AN7	AN3029*	UD5047	XN1158
12	AN3027*	UD5109	UD5049	UD4070	UD4019	AN7	UD5053	UD4056	UD4123	UD6045	UD5013*	UD4125	UD6106	UD5048	XN2117
13	UD6066	AN3007*	UD6040	UD5119	XN2017	AN3030*	UD5051	UD6107	UD4064	XN2030	UD6043	AN3022*	UD5067	UD5114	XN2109*
14	XN2095*	AN7	AN3026*	UD5118	AN7	UD6048	AN3120*	AN7	AN3049*	AN7	UD4031*	AN7	UD6044	UD5110	XN1155
15	UD4063	XN2067*	UD6098	AN3084*	AN3001*	AN3081*	UD6074	AN3097*	UD4009	XN2094*	UD6025	UD4022*	UD4069	UD4096	XN1162
16	UD4080	XN2100*	UD6030	AN3016*	AN3122*	AN3023*	UD6081	AN3116*	UD4140*	XN2068*	UD6088	UD4060	UD4067	UD4089	XN2092*
17	XN2052*	AN7	AN3060*	UD5033*	AN7	UD6085	AN3063*	AN7	AN3091*	AN7	UD4075	AN7	UD6032	UD5026*	XN2054*
18	UD6031	AN3078*	UD6084	UD5090	XN1152	AN3048*	UD5024*	UD6027	UD4079	XN1151	UD6092	AN3061*	UD5021*	UD5101	XN2008
19	AN3121*	UD5104	UD5001	UD4068	UD4014*	AN7	UD5031*	UD4139*	UD4023*	UD6093	UD5136	AN4003*	UD6008	UD5029*	XN2039*
20	AN3015*	AN7	XN2076*	UD4013*	UD4084	UD5088	AN3005*	UD4086	AN3111*	XN2051*	UD6118	AN7	AN3047*	UD5023*	XN1020
21	AN3077*	UD6090	AN3024*	AN7	UD5099	UD6083	UD5089	AN7	XN2136	AN7	AN3006*	UD5105	UD5092	UD4135*	XN2038*
22	UD6116	AN3110*	UD5106	UD5100	AN3108*	UD5096	XN2135	UD5027	UD5022*	UD6003	LYV154	UD6089	AN3093*	XN1141	XN2083*
23	AN3115*	AN7	UD6009	UD4049	AN7	UD5006	UD4134*	UD4142*	UD5060	AN7	UD4133	AN3112*	AN7	XN1081	
24	UD4035*	AN3062*	UD4036*	UD4037*	AN3105*	XN2011	UD5037*	UD4008*	UD4007*	UD6006	UD4004*	AN3129*	XN2064*		
25	XN2078*	AN7	XN2057*	UD6024	XN2090*	AN7	UD6007	UD5002	UD6005	UD4136*	AN3065*	XN2082*	XN2133		
26	UD6033	UD4090	UD6004	UD5025*	UD6082	AN3017*	UD5097	AN7	UD4081	UD4148	XN2069*				
27	UD4132*	AN7	AN3109*	UD4030*	AN7	UD5034*	UD6095	UD4083*	AN3117	XN1157					
28	UD4002	UD6023	UD5107	UD6091	AN3059*	WA6002	AN3094*	AN3106*	XN2043*	XN2001*					
29	UD4074	UD5059	UD5038*	UD5098	UD5032*	UD4085	XN2060*	XN1125							
30	XN1142	XN2036*	XN2059*	XN2042*	XN2107*	XN2093*	XN2074*								

AN7 are fresh 9x9-9X assemblies loaded in Cycle 8.  
\* Assemblies with Reused Channels