10 CFR 50.12

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Washington, DC 20555-0001

Reference: NRC Letter dated August 11, 2008, from Mr. Michael T. Markley to Mr. Randall K. Edington, Palo Verde Nuclear Generating Station, Unit 1 - Request for Additional Information re: Request for Temporary Exemption from 10 CFR 50.46 and 10 CFR 50, Appendix K For Lead Fuel Assemblies (TAC NO. MD8330)

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Docket Nos. STN 50-528, 50-529 and 50-530
Response to the NRC Request for Additional Information Related to the Request for Temporary Exemption from the Provisions of 10 CFR 50.46 and 10 CFR 50, Appendix K for Lead Fuel Assemblies

By letter dated March 08, 2008 (102-05826), Arizona Public Service Company (APS) submitted a request for a temporary exemption from the provisions of 10 CFR 50.46 and 10 CFR 50, Appendix K for Lead Fuel Assemblies (LFAs) for PVNGS Unit 1. In the referenced letter, the Nuclear Regulatory Commission (NRC) issued a request for additional information (RAI) and asked that a response be submitted within 30 days. APS' response is enclosed.

This letter contains commitments described in Enclosure 2. If you have questions regarding this submittal, please contact Russell Stroud, Licensing Section Leader, Regulatory Affairs, at (623) 393-5111.

Sincerely,

D. C. Mims

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NRR

DCM/TNW/RAS/RKR/gat

Enclosures: 1. APS Response to the NRC RAI related to the Request for a Temporary Exemption for Lead Fuel Assemblies
2. Commitments

cc:	E. E. Collins Jr.	NRC Region IV Regional Administrator
	B. K. Singal	NRC NRR Project Manager
	R. I. Treadway	NRC Senior Resident Inspector for PVNGS

Enclosure 1

APS Response to the NRC RAI related to the Request for a Temporary Exemption for Lead Fuel Assemblies

Enclosure 1 APS Response to the NRC RAI related to the Request for a Temporary Exemption for Lead Fuel Assemblies

NRC Question 1

The proposed temporary exemption will allow up to eight LFAs manufactured by AREVA NP with fuel rods with M5 to be inserted into the Palo Verde Unit 1 core in non-limiting locations. The LFAs are scheduled for use in three operating cycles of irradiation for Palo Verde Unit 1 (Cycles 15, 16, and 17). Please provide: (1) the analyses and methodologies used to identify the locations of the non-limiting locations; (2) the criteria and the key parameters used to determine the non-limiting locations; and (3) justification for the applicability of analyses for Cycle 15 to future Cycles 16 and 17 with respect to the analytic methods, key parameters, and non-limiting locations.

APS Response to NRC Question 1

(1) Palo Verde Technical Specification (TS) 4.2.1 "Fuel Assemblies," states that "The reactor shall contain 241 fuel assemblies. Each assembly shall consist of a matrix of Zircaloy or ZIRLO fuel rods with an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material" and "Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in non-limiting core regions. Other cladding material may be used with an approved exemption."

Upon approval, APS will place eight AREVA Lead Fuel Assemblies (LFAs) employing M5 cladding and guide tube material and gadolinia burnable absorber in non-limiting core regions in the Unit 1 Cycle 15 core. APS has defined non-limiting core regions as meaning that the LFAs are designed and physically located in the core such that the peak integrated radial power peaking factor in the LFAs would be 0.95 or less of the core maximum integrated radial power peaking factor at each time in life. This criterion for a non-limiting core region is similar to that used in previous Combustion Engineering pressurized water reactor LFA programs at Waterford-3 and Calvert Cliffs.

APS designed the LFA lattice and Cycle 15 core during the core design phase of the reload effort. APS then verified in the core physics analyses that the placement of the LFAs in the Cycle 15 core would satisfy the criterion for non-limiting core regions, as previously defined above. In other words, the non-limiting core regions are not pre-identified as such, but verified to be non-limiting in the APS cycle-specific core physics calculations. The Cycle 15 core physics calculations performed by APS verify that LFA peak integrated radial power peaking factor is less than 0.95 of the core maximum integrated radial power peaking factor at each time in life. The AREVA LFAs are explicitly modeled in the Palo Verde core physics models, including the gadolinia burnable absorber. As such, the impact of the LFAs is included in the Palo Verde cycle-specific core

physics calculations supporting the reload effort. APS designed the LFA lattice, Cycle 15 core, and performed the reload analyses supporting the Cycle 15 reload using the STUDSVIK CASMO/SIMULATE Code package. The reload analyses performed by APS for Cycle 15 are the same analyses performed for a standard Palo Verde Reload and are consistent with the current Core Operating Limits Report (COLR) methodology references (Palo Verde TS 5.6.5). The reload methodology used by APS is the Westinghouse (ABB-CE) reload methodology. The NRC previously approved APS' use of both the STUDSVIK CASMO/SIMULATE code package for Palo Verde including the use of gadolinia burnable absorber and the Westinghouse (ABB-CE) reload methodology (references 1 and 2, respectively).

An underlying assumption of the LFA program was that a 5% power peaking penalty would be sufficient to ensure that the LFAs would be non-limiting in the safety, fuel performance, thermal-hydraulic, and Emergency Core Cooling System (ECCS) performance analyses. The 0.95 power peaking factor criterion applied to the LFA is a means of applying a 5% penalty to the LFA. This 5% penalty provides additional Departure from Nucleate Boiling (DNB) and Loss of Coolant Accident (LOCA) margin to ensure that the LFA is non-limiting. Since the LFAs will not be in the highest core power density locations, the placement scheme assures that the behavior of the LFAs is bounded by the safety analyses performed for the co-resident fuel assemblies. This is verified by analyses performed by APS, AREVA, and Westinghouse. Additionally, the maximum LFA integrated fuel rod burnup will be maintained less than or equal to 60 MWd/kgU, the Palo Verde limit in Updated Final Safety Analysis Report (UFSAR) section 4.3.1.1 "Excess Reactivity and Fuel Burnup."

In addition to satisfying the power peaking factor criterion for a non-limiting region, the placement of the eight (8) LFAs in Cycle 15 will be toward the interior of the core in order to accumulate duty and burnup. Figure 1 shows the Cycle 15 locations of the 8 LFAs in bold shaded highlight; the core grid locations are provided in the note at the bottom of the figure.

(2) The non-limiting core regions are not identified or determined as such, but verified to be non-limiting in the cycle-specific core physics calculations. The criteria used to verify that a core region is non-limiting with respect to the LFAs is the peak integrated radial power peaking factor in the LFAs, as physically located in the Cycle 15 core, being 0.95 or less of the core maximum integrated radial power peaking factor at each time in life. The key parameter used to verify that the core region is non-limiting is integrated radial power peaking factor. As stated in the response to item (1) above, the 95% power peaking factor criterion applied to the LFA is a means of applying a 5% penalty to the LFA. This 5% penalty provides additional Departure from Nucleate Boiling (DNB) and Loss of Coolant Accident (LOCA) margin to ensure that the LFA is non-limiting. Since the LFAs will not be in the highest core power density locations, the placement

scheme assures that the behavior of the LFAs is bounded by the safety analyses performed for the co-resident fuel assemblies.

(3) In Cycle 16, four (4) of the LFAs will be located in the core interior and four (4) on the core periphery. In Cycle 17, four (4) or eight (8) LFAs will be located on the core periphery. Scoping fuel managements were done for Cycles 16 and 17 to determine design feasibility. For future Cycles 16 and 17, APS will perform explicit neutronics modeling and analysis of the AREVA LFAs using the STUDSVIK CASMO/SIMULATE code package in the same manner as was performed for the lead cycle, Cycle 15. The physical placement of the LFAs in these cycles in addition to their being once or twice burned will ensure that the LFAs will continue to operate at power peaking factors lower than the 0.95 power peaking criterion used in Cycle 15, thereby ensuring that the LFAs remain in non-limiting locations (i.e., core regions). The analyses performed for Cycles 16 and 17 will use the same generic, cycle-independent methodologies employed in Cycle 15. Cycle 16 and Cycle 17 specific power distribution data obtained from the neutronics models will be used in the evaluation and analysis of the LFAs in each cycle.

NRC Question 2

Please provide clarification in terms of key parameters that: (1) the ECCS performance would not be adversely affected due to the similarities in the material properties of the M5 alloy to Zircaloy or ZIRLO and the location of LFAs in non-limiting locations; and (2) the application of the Baker-Just equation will continue to bound all post-LOCA scenarios for M5 alloy conservatively.

APS Response to NRC Question 2

(1) From an ECCS performance analysis perspective, the AREVA LFAs were evaluated relative to the co-resident Westinghouse batch fuel. Thermal-hydraulic and geometrical differences between AREVA and Westinghouse fuel designs were evaluated. Clad swell, rupture and oxidation, fuel assembly power, peak cladding temperatures (PCTs), Small Break Loss-of-Coolant Accident (LOCA), coolable geometry, long-term cooling, and gadolinia burnable absorber were considered. The U-235 enrichment of the gadolinia fuel rods is reduced relative to the highest enrichment rod in the LFA, consistent with the AREVA Core Design Guidelines. The gadolinia fuel rod enrichment reduction ensures that the gadolinia bearing fuel rods are non-limiting and bounded by the uranium dioxide fuel rods.

APS has concluded, based primarily on the 5% radial power peaking penalty and the conclusion that this 5% margin dwarfs various offsetting effects due to minor differences in geometry and initial pin pressure, that the LFAs would be non-

limiting relative to the batch fuel. This assures that the LFAs are covered by the Westinghouse Analysis of Record (see response to Question 3 for more details) and thus would comply with the criteria of 10 CFR 50.46.

(2) USNRC report NUREG/CR-6967 (ANL-07/04), "Cladding Embrittlement During Postulated Loss-of-Coolant Accidents," (NRC ADAMS Accession No. ML082130389) identified the importance of the Baker-Just equation relative to LOCA accident evaluations stating that "This mechanism (diffusion of oxygen into the metal) was also understood in 1973 and is accommodated by the 17% ECR [equivalent cladding reacted] limit in NRC's regulation, provided oxidation is calculated with the Baker-Just correlation that was used in deriving the limit." Framatome Cogema Fuels (FCF), now AREVA, has previously performed high temperature oxidation tests for M5 cladding to confirm that the Baker-Just oxidation correlation remains conservative for M5 cladding.

A comparison of M5 cladding measured values to Baker-Just predictions demonstrated that the Baker-Just correlation remained conservative for temperatures typically calculated for LOCA, up to 1250 °C (~2280 °F). The NRC staff asked FCF to provide Arrhenius plots of the high-temperature oxidation data in order to provide a measure of bias and uncertainty in the data. FCF provided these plots which demonstrated only small uncertainties and essentially no biases in the data. The FCF data demonstrates that high-temperature oxidation of the M5 alloy cladding is bounded by the Baker-Just correlation and that the Appendix K requirement for the use of Baker-Just remains conservative in relation to the use of M5 cladding. This conclusion is documented in the NRC Safety Evaluation (SE) dated February 4, 2000, for FCF Report No. BAW-10227-A, "Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel," dated February 2000 (NRC ADAMS Accession No. ML003686365).

The NRC staff has subsequently reaffirmed this conclusion regarding the applicability of Baker-Just to M5 cladding for post-LOCA scenarios in the NRC SE associated with a similar exemption for ANO-1 to use M5 clad fuel assemblies in its PWR (July 2005) stating that "...TR BAW-10227P demonstrated the Baker-Just equation (used in the ECCS evaluation model to determine the rate of energy release, cladding oxidation, and hydrogen generation) is conservative in all post-LOCA scenarios with respect to M5 advanced alloy as a fuel rod cladding material." (NRC exemption approval for Arkansas Nuclear One, Unit 1 - Exemption From 10 CFR 50.46 and 10 CFR Part 50, Appendix K (TAC NO. MC4612), dated July 25, 2005 (NRC ADAMS Accession No. ML051790417).

Enclosure 1 APS Response to the NRC RAI related to the Request for a Temporary Exemption for Lead Fuel Assemblies

NRC Question 3

Please describe the joint effort with respect to roles to be played between APS, AREVA, and Westinghouse for evaluations: (1) to verify performance of the LFAs with respect to the safety analysis such as thermal-hydraulic compatibility, loss-of-coolant accident (LOCA) and non-LOCA criteria, mechanical design, seismic and core physics; and (2) to verify the insertion of the AREVA LFAs does not adversely impact the fuel performance and mechanical integrity of the co-resident fuel.

APS Response to NRC Question 3

(1) APS' AREVA LFA design and engineering effort required the resources and coordination of all three organizations, APS, AREVA, and Westinghouse. While each organization had its own project manager, the APS project manager maintained overall responsibility for the design effort. APS conducted weekly teleconferences between APS and AREVA and between APS and Westinghouse to coordinate the project. As necessary, APS facilitated three-way teleconferences to exchange information and resolve issues. APS participated in a three-party proprietary information agreement which allowed for a candid and unrestrained exchange of technical information to ensure the compatibility of the LFAs with the Palo Verde co-resident fuel and core internals.

APS acted as the intermediary between AREVA and Westinghouse to ensure that each organization had the necessary and appropriate inputs to perform their analyses. APS had responsibility for the LFA and core design, physics analyses, and base scope reload analyses typically performed to support a standard Palo Verde Reload.

AREVA was responsible for the testing and analyses supporting the LFA. AREVA conducted flow tests on both the AREVA LFA and the Westinghouse co-resident fuel assembly using identical geometries and test conditions to determine and compare hydraulic characteristics. The AREVA analysis scope included the mechanical design and analysis of the LFAs, the thermal-hydraulics/DNB performance analysis, fuel performance analysis, LOCA evaluation, CEA Ejection/Fuel Centerline Melt Analysis, and the combined seismic and LOCA loads. Westinghouse performed a Compatibility Analysis to verify that the insertion of the AREVA LFAs does not adversely impact the fuel performance and mechanical integrity of the co-resident Westinghouse fuel.

To assess the impact of the LFAs on the safety analyses, Westinghouse conducted detailed evaluations in several functional areas such as Structural/Seismic Analysis, Mechanical Design, Emergency Core Cooling System Performance, LOCA Dose Assessment, Thermal Hydraulics, and Criticality Safety.

(2) As part of the LFA program, Westinghouse performed a Compatibility Analysis to verify that the insertion of the AREVA LFAs does not adversely impact the fuel performance and mechanical integrity of the co-resident Westinghouse fuel. To assess the impact of the LFAs on the safety analyses, Westinghouse conducted detailed evaluations in several functional areas such as Structural/Seismic Analysis, Mechanical Design, Emergency Core Cooling System Performance, LOCA Dose Assessment, Thermal Hydraulics, and Criticality Safety. Westinghouse used their NRC approved codes and methods in their analyses supporting the AREVA LFAs.

In the APS request for the cladding exemption for the Lead Fuel Assemblies[1] it was stated that "the effectiveness of the ECCS in Palo Verde Unit 1 will not be affected by insertion of eight LFAs." However, the Westinghouse Emergency Core Cooling System Performance evaluation (in the initial Compatibility Analysis transmitted to APS, July 14, 2008) identified a 4 °F impact to the calculated PCT in the Westinghouse fuel due to the presence of the LFAs. It should be noted that the Westinghouse Compatibility Analysis and the Palo Verde LBLOCA analysis of record (AOR) are very conservative relative to the current Palo Verde Unit 1 Cycle 15 reload design. These conservatisms include the following:

- The AREVA LFAs have been measured to have a 3% higher pressure drop, but for the purposes of the Westinghouse evaluation the LFAs were conservatively analyzed with a 16.5% higher pressure drop.
- The Westinghouse AOR evaluated fuel rod designs with both Zircaloy-4 and ZIRLO™ cladding. The Westinghouse AOR limiting ECCS Performance Analysis PCT results are based on the more limiting fuel rod design, which is Zircaloy-4 cladding. This fuel rod design and cladding type have been replaced in current Palo Verde core designs with a less limiting fuel rod design with ZIRLO™ cladding. However, the limiting ECCS Performance Analysis results continue to be conservatively based on the previous cladding type.
- The Westinghouse AOR limiting ECCS Performance Analysis results are based on an assumed core integrated radial peaking factor of 1.65 at full power, all rods out. The actual calculated value for the Unit 1 Cycle 15 core is 1.41. This conservatism alone will more than compensate for the 4 °F PCT adder recommended by the Westinghouse Compatibility Analysis.

Based upon the Westinghouse Compatibility study, Palo Verde Unit 1 Cycle 15 with the insertion of eight AREVA LFAs will continue to meet all of the regulatory limits of 10 CFR 50.46 (PCT less than 2200 °F, maximum localized clad oxidation less than 17%, Total Core Wide oxidation less than 1%, a coolable geometry is maintained and the capability for Long Term Cooling of the core is demonstrated). The current Palo Verde Unit 1 PCT margin assessment indicates no need for a

[1] (APS letter 102-05826, dated March 08, 2008)

30-day report for this small (4 °F) change in PCT. Based upon this new information, it is APS's intention to include the additional 4 °F PCT adder in the Emergency Core Cooling System (ECCS) Performance Evaluation Models and 10 CFR 50.46(a)(3)(ii) Annual Report for Calendar Year 2008 to conservatively account for the impact of inserting the AREVA LFAs in the Unit 1 Cycle 15 reload core.

NRC Question 4

It appears that Commitments 4, 5, and 6 (attached to the Palo Verde application dated March 8, 2008) will be completed by October 30, 2008. Please describe methodologies and data used to evaluate the Palo Verde core physics models, thermal-hydraulic/neutronic compatibility, and impact on the co-resident fuels with respect to insertion of the AREVA LFAs.

APS Response to NRC Question 4

To evaluate the impact of the LFAs on the co-resident fuel, APS performed explicit core physics modeling and analysis of the AREVA LFAs using the STUDSVIK CASMO/SIMULATE code package. The AREVA LFAs are explicitly modeled in the Palo Verde core physics models, including the gadolinia burnable absorber. As such, the impact of the LFAs is included in the Palo Verde cycle-specific core physics calculations supporting the reload effort. APS uses the STUDSVIK CASMO/SIMULATE code package to design the Palo Verde cores and to perform the reload analyses. The reload analyses performed by APS for Cycle 15 are the same analyses performed for a standard Palo Verde Reload. Additional analyses were performed to support AREVA and Westinghouse data requests. The reload methodology used by APS is the Westinghouse (ABB-CE) reload methods which are consistent with the current COLR methodology references. The NRC previously approved APS' use of the STUDSVIK CASMO/SIMULATE code package for Palo Verde including the gadolinia burnable absorber and the Westinghouse (ABB-CE) reload methodology (references 1 and 2, respectively).

Each Fuel vendor used their respective NRC approved codes and methods in their analyses supporting the AREVA LFAs. As previously stated, APS acted as the intermediary between AREVA and Westinghouse to ensure that each organization had the necessary and appropriate inputs (data) to perform their analyses. For example, AREVA transmitted various geometric and dimensional information, grid loss coefficients, first six natural frequencies and mode shapes, lateral stiffness, critical damping ratios, and impact stiffness data to Westinghouse. Similarly, Westinghouse transmitted various geometric and dimensional information, various mechanical design information, fuel assembly first six natural frequencies and mode shapes, lateral load vs. deflection, and vertical LOCA force data to AREVA. APS transmitted to AREVA such information as the LFA lattice design, Cycle 15 core locations, fuel rod power

histories, peaking distortion factors for CEA Ejection, core limiting state points for DNB analysis, and core characteristics (temperatures, pressures, flow) information. See the response to question 3, item (2) for the affects on co-resident fuel.

References

1. Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Amendment No. 132 to Facility Operating License No. NPF-41, Amendment No. 132 to Facility Operating License No. NPF-51, and Amendment No. 132 to Facility Operating License No. NPF-74, Arizona Public Service Company, et al, Palo Verde Generating Station, Units 1, 2, and 3, Docket Nos. STN 50-528, STN 50-529, and STN 50-530, March 20, 2001. (TAC NOS. MA9279, MA9280, AND MA9281)
2. Safety Evaluation by the Office of Nuclear Reactor Regulation Relating to on-Site Audit of Palo Verde Reload Analysis Methodology, Arizona Public Service Company, Docket Nos. 50-528, 50-529, 50-530, June 14, 1993. (TAC NOS. M85153, M85154, AND M85155)

Enclosure 1 APS Response to the NRC RAI related to the Request for a Temporary Exemption for Lead Fuel Assemblies

Figure 1
PVNGS Unit 1 Cycle 15 Full Core Load Map

Full Core Loading Map for The Next Cycle of Palo Verde Unit 1

Key to Map

W121 N	Assembly Serial Number Orientation (N,E,S,W)
	Assembly Location
P3H001	Assembly Serial Number
S 0 E	Location of Assembly in Previous Cycle

N
^
W<----+---->E
v
S

	T	S	R	P	N	M	L	K	J	H	G	F	E	D	C	B	A
17						1 * P1R212 37	2 * P1R114 83	3 * P1R408 117	4 * P1R510 238	5 * P1R405 229	6 * P1R115 91	7 * P1R204 41					
16				8 * P1R308 98	9 * P1R210 237	10 * P1T102	11 * P1T203	12 * P1T219	13 * P1T220	14 * P1T222	15 * P1T225	16 * P1T110	17 * P1R214 239	18 * P1R305 110			
15			19 * P1R410 85	20 * P1T114	21 * P1T212	22 * P1S311 148	23 * P1T428	24 * P1S527 149	25 * P1S102 77	26 * P1S512 161	27 * P1T421	28 * P1S315 162	29 * P1T221	30 * P1T107	31 * P1R411 89		
14		32 * P1R301 24	33 * P1T115	34 * P1T302	35 * P1S404 69	36 * P1T402	37 * P1S510 127	38 * **P1T507**	39 * P1S524 87	40 * **P1T506**	41 * P1S517 208	42 * P1T432	43 * P1S401 71	44 * P1T303	45 * P1T112	46 * P1R303 26	
13		47 * P1R211 112	48 * P1T209	49 * P1S402 101	50 * P1T411	51 * P1S410 139	52 * P1T433	53 * P1S502 36	54 * P1S109 212	55 * P1S528 42	56 * P1T424	57 * P1S413 58	58 * P1T404	59 * P1S412 107	60 * P1T210	61 * P1R216 96	
12	62 * P1R201 82	63 * P1T101	64 * P1S306 15	65 * P1T415	66 * P1S416 50	67 * P1S116 179	68 * P1S207 221	69 * P1S313 131	70 * P1S405 73	71 * P1S303 145	72 * P1S203 213	73 * P1S105 226	74 * P1S414 137	75 * P1T416	76 * P1S310 11	77 * P1T111	78 * P1R208 92
11	79 * P1R111 52	80 * P1T207	81 * P1T422	82 * P1S516 44	83 * P1T431	84 * P1S206 194	85 * P1T427	86 * P1R505 1	87 * P1T409	88 * P1R513 7	89 * P1T436	90 * P1S204 182	91 * P1T408	92 * P1S509 217	93 * P1T417	94 * P1T215	95 * P1R101 56
10	96 * P1R420 128	97 * P1T202	98 * P1S504 27	99 * **P1T503**	100 * P1S503 65	101 * P1S314 14	102 * P1R504 62	103 * P1T438	104 * P1S106 222	105 * P1T430	106 * P1R503 78	107 * P1S309 12	108 * P1S506 75	109 * **P1T501**	110 * P1S519 23	111 * P1T211	112 * P1R401 54
9	113 * P1R508 129	114 * P1T206	115 * P1S101 10	116 * P1S514 119	117 * P1S111 209	118 * P1S408 67	119 * P1T403	120 * P1S103 45	121 * P1M339	122 * P1S104 197	123 * P1T435	124 * P1S406 175	125 * P1S112 33	126 * P1S501 123	127 * P1S115 232	128 * P1T201	129 * P1R507 113
8	130 * P1R403 188	131 * P1T213	132 * P1S521 219	133 * **P1T505**	134 * P1S526 167	135 * P1S316 230	136 * P1R509 164	137 * P1T426	138 * P1S107 20	139 * P1T429	140 * P1R501 180	141 * P1S301 228	142 * P1S513 177	143 * **P1T508**	144 * P1S522 215	145 * P1T218	146 * P1R404 114
7	147 * P1R110 186	148 * P1T228	149 * P1T419	150 * P1S508 25	151 * P1T423	152 * P1S208 60	153 * P1T437	154 * P1R511 235	155 * P1T414	156 * P1R506 241	157 * P1T420	158 * P1S202 48	159 * P1T413	160 * P1S518 198	161 * P1T418	162 * P1T226	163 * P1R102 190
6	164 * P1R202 150	165 * P1T103	166 * P1S308 231	167 * P1T405	168 * P1S411 105	169 * P1S108 16	170 * P1S201 29	171 * P1S304 97	172 * P1S407 169	173 * P1S302 111	174 * P1S205 21	175 * P1S114 63	176 * P1S415 192	177 * P1T434	178 * P1S307 227	179 * P1T116	180 * P1R205 160
5		181 * P1R203 146	182 * P1T216	183 * P1S403 135	184 * P1T439	185 * P1S409 184	186 * P1T407	187 * P1S525 200	188 * P1S110 30	189 * P1S523 206	190 * P1T425	191 * P1S418 103	192 * P1T401	193 * P1S417 141	194 * P1T214	195 * P1R215 130	
4		196 * P1R307 216	197 * P1T104	198 * P1T304	199 * P1S420 171	200 * P1T440	201 * P1S515 34	202 * **P1T502**	203 * P1S505 155	204 * **P1T504**	205 * P1S507 115	206 * P1T410	207 * P1S419 173	208 * P1T301	209 * P1T109	210 * P1R306 218	
3			211 * P1R412 153	212 * P1T113	213 * P1T227	214 * P1S312 80	215 * P1T406	216 * P1S511 81	217 * P1S113 165	218 * P1S520 93	219 * P1T412	220 * P1S305 94	221 * P1T204	222 * P1T106	223 * P1R409 157		
2				224 * P1R302 132	225 * P1R207 3	226 * P1T105	227 * P1T223	228 * P1T224	229 * P1T208	230 * P1T205	231 * P1T217	232 * P1T108	233 * P1R213 5	234 * P1R304 144			
1						235 * P1R206 201	236 * P1R104 151	237 * P1R407 13	238 * P1R512 4	239 * P1R402 125	240 * P1R106 159	241 * P1R209 205					

Note: The AREVA LFAs are located in Core Grid Locations K-14, H-14, P-10, D-10, P-8, D-8, K-4, and H-4.

ENCLOSURE 2

Commitments

Enclosure 2 Commitments

1. For Unit 1 Cycle 16, APS will perform explicit neutronics modeling and analysis of the AREVA LFAs using the STUDSVIK CASMO/SIMULATE code package in the same manner as was performed for Cycle 15. The analyses performed for Cycle 16 will use the same generic, cycle-independent methodologies employed in Cycle 15. Cycle 16 specific power distribution data obtained from the neutronics models will be used in the evaluation and analysis of the LFAs in this cycle. (Question 1, Item 3 response, RCTSAI 3220607, Due 4/30/2010)

2. For Unit 1 Cycle 17, APS will perform explicit neutronics modeling and analysis of the AREVA LFAs using the STUDSVIK CASMO/SIMULATE code package in the same manner as was performed for Cycle 15. The analyses performed for Cycle 17 will use the same generic, cycle-independent methodologies employed in Cycle 15. Cycle 17 specific power distribution data obtained from the neutronics models will be used in the evaluation and analysis of the LFAs in this cycle. (Question 1, Item 3 response, RCTSAI 3220608, Due 10/30/2011)