June 26, 2006

MEMORANDUM TO: Michael J. Case, Director
Division of Inspection and Regional Support

THRU: Timothy J. Frye, Chief ***/RA/by R. Pedersen for/***
Health Physics Branch
Division of Inspection and Regional Support

FROM: Charles S. Hinson, Senior Health Physicist
Health Physics Branch
Division of Inspection and Regional Support

SUBJECT: LWR OCCUPATIONAL DOSE DATA FOR 2005 AND THREE-YEAR ROLLING AVERAGE COLLECTIVE DOSE DATA AND QUARTILE DATA FOR 2003-2005

Enclosed for your information is a compilation of the 2005 occupational collective doses as well as the three-year rolling average collective doses for operating U.S. nuclear power plant facilities. This data, which was derived from individual worker dose reports submitted to the Commission in accordance with 10 CFR 20.2206, is provided for each of the 103 operating commercial nuclear plants (69 PWRs and 34 BWRs) in the U.S. plus Brown's Ferry 1 (a BWR which is scheduled to restart in 2007 after being shutdown since 1985).

The average collective dose in 2005 for LWRs was 110 person-cSv (person-rem) per reactor. Although this average collective dose is 11 percent higher than the average collective dose in 2004, it is still the third lowest average annual dose per reactor ever recorded for U.S. LWRs. This average dose is almost half of the average LWR dose recorded ten years ago (in 1995) and is nearly one eighth of the maximum LWR average dose of 790 person-cSv (person-rem) per reactor recorded in 1980. This low average collective dose reflects industries' continuing commitment to the lowering of plant doses by implementing effective exposure reduction initiatives.

Also in this report is a listing of the nuclear plants ranked by quartile, as determined by their three-year rolling average collective doses. The baseline inspection procedures for the Occupational Radiation Safety cornerstone utilize the plant's quartile ranking to help in determining inspection resources and the minimum inspection requirement sample size. A plant's three-year rolling average collective dose is also used as one of the metrics in the Occupational Radiation Safety SDP.

This report was compiled by Charles Hinson, NRR, NRC. The collective doses for 2005 were compiled by our contractor, ORAU. Any questions concerning the content of this report should be directed to Charles Hinson at (301) 415-1845.

Enclosure:
As stated

CONTACT: Charles Hinson, DIRS/IHPB
415-1845

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# LWR OCCUPATIONAL DOSE DATA FOR 2005
# AND THREE-YEAR ROLLING AVERAGE COLLECTIVE DOSE DATA
# AND QUARTILE DATA FOR 2003-2005

This report contains a compilation of the 2005 occupational collective doses for U.S. nuclear power plant facilities, the three-year rolling average collective dose data for 2003-2005, and a listing of the three-year rolling average collective dose rankings for 2003-2005 by quartile for PWRs and BWRs.

## 2005 Collective doses

The occupational collective dose information was derived from individual worker dose reports submitted to the Commission in accordance with 10 CFR 20.2206. The number of operating reactors in the U.S. in 2005 remained the same as in the year 2004, at 103 reactors. Brown's Ferry, Unit 1, which is scheduled to restart in 2007 (after being shutdown since 1985), has been included in this analysis, increasing the total number of reactors analyzed for this report to 104 LWRs. The total collective dose for these 104 LWRs in 2005 was 11,456 person-cSv (person-rem), an 11% increase over last year's record low total of 10,367 person-cSv (person-rem). The resulting average collective dose of 110 person-cSv (person-rem) per reactor for LWRs for 2005 is the third lowest average collective dose ever recorded for U.S. LWRs (after the low LWR average collective doses per reactor recorded in 2004 and 2001).

In 2005, the total collective dose for PWRs was 5,460 person-cSv (person-rem) for 69 reactors. The resulting average collective dose per reactor for PWRs in 2005 was 79 person-cSv (person-rem) per reactor. Although this average represents an 11% increase from the 2004 value of 71 person-cSv (person-rem) per reactor, it is the second lowest average dose recorded to date for US PWRs (after the average dose recorded for PWRs in 2004). This is the seventh year that the average annual PWR dose has been less than 100 person-cSv (person-rem) per reactor. The collective dose information for PWRs is shown in Table 1.

The total collective dose for BWRs in 2005 was 5,996 person-cSv (person-rem) for 35 reactors. The resulting average collective dose for BWRs in 2005 was 171 person-cSv. The BWR average collective dose for 2005 is the fourth lowest recorded average dose per unit for BWRs (the lowest average BWR dose of 138 person-cSv (person-rem) per unit was recorded in 2001). The collective dose information for BWRs is shown in Table 2.

Although the average collective doses increased slightly in 2005 from those recorded in 2004, the continued low average collective doses reflect industries' continuing commitment to the lowering of plant doses by implementing effective exposure reduction initiatives such as source term reduction programs, efficient outages, online chemistry control, and effective ALARA programs. One of the noted differences between the collective doses recorded in 2004 and those recorded in 2005 were the number of plants having collective doses equal to or less than 10 person-cSv (person-rem) for the year. In 2004, ten LWRs had collective doses equal to or less than 10 person-cSv (person-rem) for the year, while in 2005, only three LWRs had annual collective doses in this range. An annual collective dose in this range usually indicates that the plant operated the entire year without any outages. Most of a plant's collective dose is usually incurred when the plant is shut down for a refueling/maintenance outage, when more work is

performed in the portions of the plant which have higher radiation levels. Therefore, the overall collective dose for LWRs will be lower in a year when more plants have been operational for a full year than in a year when more plants have been shut down for part of the year for outage work.

Rolling three-year average collective dose

Since refueling outage cycles vary among U.S. plants, this results in alternating high and low collective dose years for some plants and more evenly distributed collective doses for others. Therefore, the use of the three-year rolling average collective dose (TYRA) has been a better indicator of a plant's average collective dose than the plant's annual collective dose. The TYRA, which has units of person-cSv (person-rem)/unit, is incorporated into the SDP (Significance Determination Process) for the Occupational Radiation Safety Cornerstone (Appendix C of MC 0609). Each licensee's current TYRA is compared against the TYRA criteria contained in the Occupational Radiation Safety SDP (135 person-cSv (person-rem)/unit for PWRs and 240 person-cSv (person-rem)/unit for BWRs) to help evaluate the significance of inspection findings in terms of the licensee's overall ALARA performance.

Tables 1 and 2 provide the three-year rolling average collective doses for 2003-2005 (under the column entitled "3 Yr Avg") for each of the operating reactors. (The last column shows the previous TYRA (for 2002-2004)). These tables also show the collective doses by reactor for each of the years 2003 through 2005.

For PWRs, the TYRA for 2003-2005 decreased at 23 reactor sites and increased at 17 sites from the previous year's values (the TYRA for 2 sites did not change). The PWR site with the lowest TYRA for 2003-2005 was Seabrook with a TYRA of 43 person-cSv (person-rem). The PWR site with the highest TYRA for 2003-2005 was Palisades with a TYRA of 195 person-cSv (person-rem). The high source term at Palisades contributed to the collective dose accrued during the outages performed in 2003 and 2004, which included steam generator work and reactor coolant pump replacement during each outage. In the 2004 outage, the licensee also performed the first reactor head inspection at Palisades. Several repairs were made as a result of this inspection.

For the 2003-2005 three-year period, only two PWRs exceeded the SDP criterion of 135 person-rem/unit for PWRs. These two PWRs were Palisades - 195 person-cSv (person-rem), and Ft. Calhoun - 169 person-cSv (person-rem). With the exception of one three-year period (2002-2004) for Ft. Calhoun, the TYRAs for both of these plants have exceeded the 135 person-rem/unit criterion for each of the past seven three-year periods (see Table 4).

For BWRs, the TYRA for 2003-2005 decreased at 11 reactor sites and increased at 13 sites from last year's values. The BWR site with the lowest TYRA for 2003-2005 was Limerick 1,2 with a TYRA of 81 person-cSv (person-rem). Perry was the BWR site with the highest TYRA with a TYRA of 366 person-cSv (person-rem). Perry has a high source term (its BRAC point average has been the second highest in the industry for several years). One of the factors contributing to Perry's high source term was the improper sequencing of hydrogen injection, noble metal chemistry addition, and zinc addition to the reactor coolant system (RCS) in the 2002-2003 time frame. This resulted in the dispersal of cobalt-60 from the reactor core to the piping surfaces throughout the RCS which increased area dose rates in the drywell and

contributed to an outage dose in 2003 which was twice what was expected. Equipment reliability problems coupled with a continued high source term in 2005 resulted in another high outage dose. Perry is in the process of implementing a number of dose reduction initiatives and anticipates a much lower outage dose in 2007. Quad Cities 1,2 was the BWR site with the second highest TYRA for 2003-2005 with a TYRA of 318 person-cSv (person-rem)/unit. Quad Cities has had a high TYRA for the past several years, due primary to a combination of water chemistry problems (caused by an unexpected reaction between the injection of noble metals and depleted zinc in the RCS which resulted in high RCS dose rates first noticed in 2000) and steam dryer problems. Extensive outage work performed at Unit 1 (which has dose rates higher than Unit 2) and steam dryer replacement at both units resulted in a collective dose of 961 person-cSv (person-rem) for Quad Cities 1,2 in 2005. Quad Cities has been implementing an aggressive source term reduction program for the past several years in an attempt to lower overall plant doses.

For the 2003-2005 three-year period, there were only two BWR sites (3 reactors) which exceeded the SDP criterion of 240 person-rem/unit for BWRs (Perry - 366 person-cSv (person-rem) and Quad Cities 1,2 - 318 person-cSv (person-rem)/unit). (These same two BWR sites also exceeded this criterion for the previous two three-year periods (2001-2003 and 2002-2004)).

It should be noted that when the SDP TYRA criteria of 135 person-cSv (person-rem)/unit for PWRs and 240 person-cSv (person-rem)/unit for BWRs were established in the late 1990s they represented the median points for the 1995-1997 TYRA for PWRs and BWRs, respectively (i.e., the TYRA for 50% the PWRs and 50% the BWRs exceeded these values). For the current TYRA (2003-2005) only 5% of the PWR sites and 8% of the BWR sites exceed these criteria (see Table 3). This is a good indication of how the industry has worked to lower the overall collective doses at US LWRs over the past several years.

Plants ranked by TYRA quartile

The baseline inspection procedures for ALARA Planning and Controls, IP 71121.02 (under the Occupational Radiation Safety cornerstone) utilize the plant's quartile ranking (based on the three-year rolling average collective doses) to help in determining plant inspection resources (see Section 04, "Resource Estimate", of IP 71121.02) and the minimum inspection requirement sample size (see Section 05, "Completion Status", of IP 71121.02).

The plant rankings by quartile listed below are based on the TYRA for 2003-2005. These rankings should remain in effect until the new TYRA for the years 2004-2006 are available. Note that last year's (2002-2004) TYRA rankings for each site are shown in parentheses ("(-)" indicates no change in the quartile rankings from last year). Tables 4 and 5 show a history of the TYRA and plant quartile information for the past seven three-year periods (1997-1999 through 2003-2005). It should be noted that plant quartile information was first officially calculated for the 2000-2002 three-year period, when this data was calculated for input into the ROP.

**PWRs**

| Top Quartile **(lowest TYRA)** | 2nd Quartile | 3rd Quartile | Bottom Quartile **(highest TYRA)** |
|---|---|---|---|
| Seabrook (-) | Robinson 2 (3) | Waterford 3 (2) | Calvert Cliffs 1,2 (-) |
| Harris (-) | North Anna 1,2 (3) | Turkey Pt. 3,4 (2) | San Onofre 2,3 (-) |
| Farley 1,2 (-) | Byron 1,2 (-) | Crystal River 3 (1) | Sequoyah 1,2 (-) |
| Prairie Island 1,2 (-) | Wolf Creek 1 (-) | Oconee 1,2,3 (-) | Watts Bar 1 (3) |
| Summer 1 (-) | Palo Verde 1,2,3 (-) | South Texas 1,2 (4) | Millstone 2,3 (-) |
| Ginna (-) | Catawba 1,2 (-) | Beaver Valley 1,2 (-) | Arkansas 1,2 (3) |
| Vogtle 1,2 (2) | Braidwood 1,2 (-) | Salem 1,2 (-) | Callaway 1 (3) |
| Pt. Beach 1,2 (2) | Indian Pt. 2 (4) | Diablo Canyon 1,2 (-) | St. Lucie 1,2 (3) |
| Kewaunee (-) | McGuire 1,2 (3) | Surry 1,2 (-) | Ft. Calhoun (-) |
| Indian Pt. 3 (-) | Comanche Pk 1,2 (-) | Davis-Besse (4) | Palisades (-) |
| | TMI 1 (1) | | |
| | Cook 1,2 (4) | | |

**BWRs**

| Top Quartile **(lowest TYRA)** | 2nd Quartile | 3rd Quartile | Bottom Quartile **(highest TYRA)** |
|---|---|---|---|
| Limerick 1,2 (-) | Grand Gulf (-) | Cooper Station (1) | LaSalle 1,2 (-) |
| Hatch 1,2 (-) | Fermi 2 (-) | Peach Bottom 2,3 (-) | Columbia (WNP 2) (1) |
| Duane Arnold (-) | Clinton (4) | Vermont Yankee (-) | Nine Mile Pt. 1,2 (-) |
| Oyster Creek (3) | Monticello (1) | Pilgrim (2) | Brown's Ferry 1,2,3*(-) |
| Fitzpatrick (3) | Brunswick 1,2 (-) | Dresden 2,3 (4) | Quad Cities 1,2 (-) |
| Susquehanna 1,2 (2) | Hope Creek 1 (-) | River Bend 1 (-) | Perry (-) |

(* Note: Even though Brown's Ferry, Unit 1 has been shut down since 1985, it is scheduled to restart in the Spring of 2007 and dose is being expended at Unit 1 in this restart effort. Therefore, Brown's Ferry is counted as a three-unit site for purposes of calculating the TYRA.)

The collective doses for the year 2005 that appear in this paper are based on a compilation of the individual doses that the licensees submitted to the NRC in accordance with 10 CFR 20.2206. A listing of the 2005 doses and 2003-2005 TYRA, along with breakdowns of individual plant doses and dose trends will be contained in Volume 27 of NUREG-0713, Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities 2005, which is scheduled to be published in the Fall of 2006.

This paper was compiled by Charles Hinson, NRR, NRC. The collective doses for 2005 were compiled by our contractor, ORAU. Any questions concerning the content of this report should be directed to Charles Hinson at (301) 415-1845.

**Table 1-PWR Collective Doses (per site) and TYRA (per unit)**

| PWR | 2003 | 2004 | 2005 | 3 Yr Avg | (prev 3-yr) |
|---|---|---|---|---|---|
| Seabrook | 71 | 6 | 52 | 43 | 48 |
| Harris | 68 | 57 | 8 | 45 | 44 |
| Farley 1,2 | 111 | 107 | 68 | 48 | 52 |
| Prairie Island 1,2 | 61 | 144 | 84 | 48 | 55 |
| Summer 1 | 71 | 10 | 72 | 51 | 47 |
| Ginna | 75 | 7 | 73 | 52 | 54 |
| Vogtle 1,2 | 84 | 81 | 151 | 53 | 68 |
| Pt. Beach 1,2 | 85 | 110 | 129 | 54 | 63 |
| Kewaunee | 73 | 91 | 4 | 56 | 56 |
| Indian Pt. 3 | 96 | 4 | 74 | 58 | 36 |
| Robinson 2 | 5 | 118 | 65 | 63 | 78 |
| North Anna 1,2 | 187 | 130 | 59 | 63 | 77 |
| Byron 1,2 | 87 | 89 | 200 | 63 | 62 |
| Wolf Creek 1 | 89 | 3 | 107 | 66 | 64 |
| Palo Verde 1,2,3 | 211 | 199 | 200 | 68 | 61 |
| Catawba 1,2 | 211 | 123 | 84 | 70 | 69 |
| Braidwood 1,2 | 245 | 95 | 88 | 71 | 72 |
| Indian Pt. 2 | 12 | 196 | 11 | 73 | 152 |
| McGuire 1,2 | 71 | 196 | 174 | 74 | 75 |
| Comanche Pk 1,2 | 66 | 135 | 242 | 74 | 71 |
| TMI 1 | 155 | 4 | 66 | 75 | 55 |
| Cook 1,2 | 210 | 156 | 91 | 76 | 107 |
| Waterford 3 | 95 | 3 | 136 | 78 | 69 |
| Turkey Pt. 3,4 | 247 | 117 | 110 | 79 | 73 |
| Crystal River 3 | 127 | 4 | 123 | 84 | 45 |
| Oconee 1,2,3 | 245 | 368 | 149 | 85 | 93 |
| South Texas 1,2 | 143 | 119 | 248 | 85 | 99 |
| Beaver Valley 1,2 | 277 | 157 | 79 | 85 | 87 |
| Salem 1, 2* | 124 | 149 | 241 | 86 | 94 |
| Diablo Canyon 1,2 | 135 | 254 | 124 | 86 | 90 |
| Surry 1,2 | 326 | 120 | 88 | 89 | 89 |
| Davis-Besse | 220 | 7 | 51 | 93 | 210 |
| Calvert Cliffs 1,2 | 265 | 144 | 168 | 96 | 109 |
| San Onofre 2,3 | 164 | 407 | 11 | 97 | 118 |
| Sequoyah 1,2 | 431 | 86 | 95 | 102 | 104 |
| Watts Bar 1 | 166 | 6 | 144 | 105 | 88 |
| Millstone 2,3* | 323 | 136 | 202 | 110 | 125 |
| Arkansas 1,2 | 99 | 106 | 476 | 113 | 78 |
| Callaway | 8 | 121 | 223 | 117 | 75 |
| St. Lucie 1,2 | 142 | 159 | 406 | 118 | 76 |
| Ft. Calhoun | 212 | 22 | 273 | 169 | 133 |
| Palisades | 203 | 371 | 10 | 195 | 199 |
| Avg. Annual Dose | 91 | 71 | 79 | | |
| No. of Reactors | 69 | 69 | 69 | | |
| Total Dose | 6296 | 4916 | 5460 | | |

*Dose calculated using RG 1.16 ratio

**Table 2-BWR Collective Doses (per site) and TYRA (per unit)**

| BWR | 2003 | 2004 | 2005 | 3 Yr Avg | (prev 3-yr) |
|---|---|---|---|---|---|
| Limerick 1,2 | 147 | 149 | 188 | 81 | 76 |
| Hatch 1,2 | 168 | 180 | 207 | 93 | 94 |
| Duane Arnold | 124 | 19 | 140 | 94 | 59 |
| Oyster Creek | 43 | 227 | 28 | 99 | 179 |
| Fitzpatrick | 51 | 186 | 63 | 100 | 156 |
| Susquehanna 1,2 | 250 | 272 | 181 | 117 | 130 |
| Grand Gulf | 31 | 158 | 168 | 119 | 122 |
| Fermi 2 | 168 | 145 | 62 | 125 | 117 |
| Clinton | 57 | 283 | 36 | 125 | 183 |
| Monticello | 169 | 35 | 175 | 126 | 81 |
| Brunswick 1,2 | 249 | 245 | 306 | 133 | 128 |
| Hope Creek 1* | 139 | 239 | 67 | 149 | 135 |
| Cooper Station | 135 | 47 | 276 | 153 | 74 |
| Peach Bottom 2,3 | 356 | 265 | 306 | 154 | 159 |
| Vermont Yankee | 54 | 212 | 198 | 155 | 139 |
| Pilgrim | 250 | 41 | 206 | 166 | 110 |
| Dresden 2,3 | 357 | 381 | 259 | 166 | 182 |
| River Bend 1 | 217 | 236 | 56 | 170 | 163 |
| LaSalle 1,2 | 464 | 359 | 335 | 193 | 212 |
| Columbia (WNP 2) | 205 | 66 | 325 | 199 | 106 |
| Nine Mile Pt. 1,2 | 375 | 449 | 402 | 204 | 223 |
| Brown's Ferry 1,2,3 | 603 | 673 | 636 | 212 | 181 |
| Quad Cities 1,2 | 438 | 511 | 961 | 318 | 456 |
| Perry | 607 | 73 | 417 | 366 | 250 |
| Avg. Annual Dose | 162 | 156 | 171 | | |
| No. of Reactors | 35 | 35 | 35 | | |
| Total Dose | 5659 | 5451 | 5996 | | |

*Dose calculated using RG 1.16 ratio

## Table 3

## Number of Plants Exceeding the 3-Yr Average Dose Criteria

| 3-yr period | PWRs > 135 person-rem | | BWRs > 240 person-rem | |
|---|---|---|---|---|
| | Sites (%) | Units (%) | Sites (%) | Units (%) |
| 1995-1997 | 20 (47%) | 33 (46%) | 13 (50%) | 19 (51%) |
| 1996-1998 | 14 (34%) | 22 (32%) | 10 (42%) | 14 (40%) |
| 1997-1999 | 13 (31%) | 20 (29%) | 4 (17%) | 6 (17%) |
| 1998-2000 | 5 (12%) | 6 (9%) | 3 (13%) | 4 (11%) |
| 1999-2001 | 6 (14%) | 7 (10%) | 1 (4%) | 1 (3%) |
| 2000-2002 | 4 (10%) | 4 (6%) | 2 (8%) | 3 (9%) |
| 2001-2003 | 3 (7%) | 3 (4%) | 2 (8%) | 3 (9%) |
| 2002-2004 | 3 (7%) | 3 (4%) | 2 (8%) | 3 (9%) |
| **2003-2005** | **2 (5%)** | **2 (3%)** | **2 (8%)** | **3 (9%)** |

**Table 4 - Seven Year History of TYRA and Plant Quartile Data for PWRs***

| PWR | 1997-1999 | 1998-2000 | 1999-2001 | 2000-2002 | 2001-2003 | 2002-2004 | 2003-2005 |
|---|---|---|---|---|---|---|---|
| Arkansas 1,2 | 78 | 99 | 89 | 102 (3) | 78 (2) | 78 (3) | 113 (4) |
| Beaver Valley 1,2 | 77 | 83 | 104 | 102 (3) | 92 (3) | 87 (3) | 85 (3) |
| Braidwood 1,2 | 121 | 100 | 73 | 64 (1) | 73 (2) | 72 (2) | 71 (2) |
| Byron 1,2 | 126 | 118 | 82 | 75 (2) | 57 (1) | 62 (2) | 63 (2) |
| Callaway 1 | 178 | 179 | 148 | 73 (2) | 70 (2) | 75 (3) | 117 (4) |
| Calvert Cliffs 1,2 | 101 | 86 | 82 | 91 (3) | 113 (4) | 109 (4) | 96 (4) |
| Catawba 1,2 | 91 | 75 | 70 | 64 (1) | 68 (1) | 69 (2) | 70 (2) |
| Comanche Peak 1,2 | 105 | 93 | 74 | 70 (1) | 68 (1) | 71 (2) | 74 (2) |
| Cook 1,2 | 138 | 102 | 89 | 107 (4) | 86 (2) | 107 (4) | 76 (2) |
| Crystal River 3 | 150 | 95 | 138 | 56 (1) | 93 (3) | 45 (1) | 84 (3) |
| Davis Besse 1 | 64 | 117 | 67 | 192 (4) | 209 (4) | 210 (4) | 93 (3) |
| Diablo Canyon 1,2 | 140 | 134 | 125 | 75 (2) | 67 (1) | 90 (3) | 86 (3) |
| Farley 1,2 | 150 | 164 | 145 | 129 (4) | 88 (3) | 52 (1) | 48 (1) |
| Fort Calhoun | 141 | 139 | 140 | 142 (4) | 201 (4) | 133 (4) | 169 (4) |
| Ginna | 90 | 89 | 87 | 56 (1) | 55 (1) | 54 (1) | 52 (1) |
| Harris | 99) | 83 | 123 | 120 (4) | 109 (3) | 44 (1) | 45 (1) |
| Indian Pt 2 | 233 | 299 | 210 | 279 (4) | 94 (3) | 152 (4) | 73 (2) |
| Indian Pt 3 | 122 | 47 | 81 | 45 (1) | 74 (2) | 36 (1) | 58 (1) |
| Kewaunee | 50 | 64 | 102 | 102 (3) | 93 (3) | 56 (1) | 56 (1) |
| McGuire 1,2 | 148 | 89 | 88 | 75 (2) | 65 (1) | 75 (3) | 74 (2) |
| Millstone 2,3 | 103 | 85 | 95 | 102 (3) | 132 (4) | 125 (4) | 110 (4) |
| North Anna 1,2 | 77 | 71 | 78 | 86 (3) | 107 (3) | 77 (3) | 63 (2) |
| Oconee 1,2,3 | 88 | 93 | 117 | 120 (4) | 117 (4) | 93 (3) | 85 (3) |
| Palisades | 161 | 154 | 202 | 138 (4) | 197 (4) | 199 (4) | 195 (4) |
| Palo Verde1,2,3 | 65 | 55 | 54 | 53 (1) | 59 (1) | 61 (2) | 68 (2) |
| Pt Beach 1,2 | 76 | 84 | 78 | 75 (2) | 66 (1) | 63 (2) | 54 (1) |
| Prairie Island 1,2 | 61 | 49 | 51 | 60 (1) | 52 (1) | 55 (1) | 48 (1) |
| Robinson 2 | 102 | 101 | 86 | 81 (2) | 80 (2) | 78 (3) | 63 (2) |
| Salem 1,2 | 89 | 93 | 111 | 107 (4) | 95 (3) | 94 (3) | 86 (3) |
| San Onofre 2,3 | 148 | 111 | 100 | 64 (1) | 72 (2) | 118 (4) | 97 (4) |
| Seabrook | 104 | 65 | 61 | 48 (1) | 49 (1) | 48 (1) | 43 (1) |
| Sequoyah 1,2 | 142 | 131 | 111 | 102 (3) | 114 (4) | 104 (4) | 102 (4) |
| South Texas 1,2 | 119 | 113 | 122 | 133 (4) | 118 (4) | 99 (4) | 85 (3) |
| St. Lucie 1,2 | 159 | 68 | 84 | 80 (2) | 88 (3) | 76 (3) | 118 (4) |
| Summer 1 | 99 | 100 | 119 | 99 (3) | 67 (1) | 47 (1) | 51 (1) |
| Surry 1,2 | 108 | 87 | 110 | 102 (3) | 124 (4) | 89 (3) | 89 (3) |
| TMI 1 | 125 | 60 | 120 | 71 (1) | 119 (4) | 55 (1) | 75 (2) |
| Turkey Pt 3,4 | 116 | 84 | 75 | 66 (1) | 70 (2) | 73 (2) | 79 (3) |
| Vogtle 1,2 | 91 | 85 | 80 | 82 (2) | 76 (2) | 68 (2) | 53 (1) |
| Waterford 3 | 98 | 93 | 87 | 82 (2) | 70 (2) | 69 (2) | 78 (3) |
| Watts Bar 1 | 72 | 75 | 76 | 74 (2) | 88 (3) | 88 (3) | 105 (4) |
| Wolf Creek 1 | 141 | 101 | 99 | 83 (2) | 65 (1) | 64 (2) | 66 (2) |

*Note: Plant quartile information (plant quartile ranking by TYRA shown in parentheses) was first officially calculated for ROP purposes for the 2000-2002 three-year period

**Table 5 - Seven Year History of TYRA and Plant Quartile Data for BWRs***

| BWR | 1997-1999 | 1998-2000 | 1999-2001 | 2000-2002 | 2001-2003 | 2002-2004 | 2003-2005 |
|---|---|---|---|---|---|---|---|
| Brown's Ferry 1,2,3 | 149 | 128 | 119 | 109 (1) | 139 (3) | 181 (4) | 212 (4) |
| Brunswick 1,2 | 204 | 189 | 174 | 150 (3) | 138 (3) | 128 (2) | 133 (2) |
| Clinton | 134 | 162 | 125 | 165 (3) | 100 (1) | 183 (4) | 125 (2) |
| Columbia (WNP2) | 231 | 165 | 145 | 109 (1) | 160 (3) | 106 (1) | 199 (4) |
| Cooper | 135 | 143 | 139 | 136 (2) | 114 (2) | 74 (1) | 153 (3) |
| Dresden 2,3 | 248 | 213 | 209 | 170 (4) | 185 (4) | 182 (4) | 166 (3) |
| Duane Arnold | 167 | 161 | 128 | 72 (1) | 99 (1) | 59 (1) | 94 (1) |
| Fermi 2 | 98 | 130 | 117 | 118 (2) | 125 (2) | 117 (2) | 125 (2) |
| Fitzpatrick | 172 | 242 | 144 | 198 (4) | 115 (2) | 156 (3) | 100 (1) |
| Grand Gulf | 212 | 188 | 149 | 132 (2) | 131 (2) | 122 (2) | 119 (2) |
| Hatch 1,2 | 228 | 175 | 160 | 141 (3) | 102 (1) | 94 (1) | 93 (1) |
| Hope Creek 1 | 228 | 174 | 208 | 123 (2) | 107 (1) | 135 (2) | 149 (2) |
| LaSalle 1,2 | 219 | 210 | 153 | 132 (2) | 166 (4) | 212 (4) | 193 (4) |
| Limerick 1,2 | 144 | 148 | 124 | 105 (1) | 86 (1) | 76 (1) | 81(1) |
| Monticello | 128 | 165 | 169 | 159 (3) | 143 (3) | 81 (1) | 126 (2) |
| Nine Mile Pt 1,2 | 209 | 185 | 179 | 190 (4) | 206 (4) | 223 (4) | 204 (4) |
| Oyster Creek | 133 | 321 | 234 | 309 (4) | 118 (2) | 179 (3) | 99 (1) |
| Peach Bottom 2,3 | 196 | 169 | 166 | 168 (4) | 172 (4) | 159 (3) | 154 (3) |
| Perry | 213 | 141 | 213 | 128 (2) | 312 (4) | 250 (4) | 366 (4) |
| Pilgrim | 334 | 155 | 192 | 90 (1) | 156 (3) | 110 (2) | 166 (3) |
| Quad Cities 1,2 | 269 | 309 | 206 | 471 (4) | 395 (4) | 456 (4) | 318 (4) |
| River Bend 1 | 250 | 206 | 256 | 153 (3) | 153 (3) | 163 (3) | 170 (3) |
| Susquehanna 1,2 | 204 | 187 | 175 | 147 (3) | 133 (2) | 130 (2) | 117 (1) |
| Vermont Yankee | 144 | 138 | 119 | 110 (1) | 116 (2) | 139 (3) | 155 (3) |

*Note: Plant quartile information (plant quartile ranking by TYRA shown in parentheses) was first officially calculated for ROP purposes for the 2000-2002 three-year period