

Pension Audit Trail Report

14:24:25 8/19/2004

Calculating Present Value of pension assuming employment through the cut-off date (often the separation date).

Calculating pension value assuming employment through the cut-off date (often the separation date):

Number of years from evaluation date (2/2/2004) to earliest retirement age (66) is 19.0767.

Number of years from evaluation date (2/2/2004) to regular retirement age (65) is 18.0767.

Using regular retirement age (65) in our calculation.

Calculating the present value factors for an annual benefit payment of \$1 as of retirement:

Calculating for gender MALE, using the GAR-94 Mortality Table, adjusted for projected declines in mortality.

The discount (interest) rate is 5.20%.

The cost of living adjustment ("COLA") is 1.20%.

Employee's age at retirement is 65.

Year 1: Age 65.

PV = Present value of \$1 payment made at the end of year 1 =  $1/(1+r)$ , where  $r = 0.05$ . This is  $1/1.0520$ , which equals 0.9506.

Calculating the present value of \$1 payment discounted also for mortality, assuming the employee was alive at retirement:

This equals:  $PV * (1 - \text{Probability of dying during the year for male gender, assuming the employee lived to retirement})$ .

The probability is derived from the Group Annuity Reserving tables of 1994 (GAR-94), adjusted for projected improvements in mortality (Scale AA).

From GAR-94, the probability of living to age 66, given that the employee lived to age 65 (retirement) is  $1 - 0.0098 = 0.9902$ .

For year 1, age 65, the \$1 payment discounted also for mortality is  $PV * 0.9902 = 0.9506 * 0.9902 = 0.9413$ .

Year 2 Age 66.

COLA adjusted benefit: Multiply previous year's \$1.0000 benefit by COLA factor of 1.01. This gives 1.0120.

Note: In the lines below, the symbol "^" means "to the power of," so, for example,  $1.025^3$  means  $1.025 * 1.025 * 1.025$ .

PV of year 2 payment is: COLA adjusted benefit /  $(1+r)^2$ . This is  $\$1.0120 / 1.0520^2$ , which equals \$0.9144.

The probability of living to age 67, given that the employee lived to age 66 is (from GAR-94 tables):  $1 - 0.0111 = 0.9889$ .

The probability of living to age 67 given that the employee lived to age 65 (retirement) is 0.9889 multiplied by 0.9902 (see above), which equals 0.9792.

To get the present value of the \$1 payment, discounted for both time (interest) and mortality, this probability is then multiplied by the present value of a \$1 payment made at the end of the year.

The present value of the \$1 payment discounted for mortality is thus \$0.9144 (the discounted COLA adjusted benefit) \* 0.9792 (the probability of living through the year given having lived to retirement), which equals \$0.8954.

The cumulative total present value is \$0.9413 (previous years total) plus \$0.8954 (this year amount), which equals \$1.8367.

The cumulative total mortality-weighted present value after n years thus equals:  $A + ( (B / (1+r)^n) * (1 - E) * F)$ , where:

A = previous years' total = total mortality-weighted present value after n-1 years.

B = COLA adjusted benefit = previous year's COLA adjusted benefit \* (1 + COLA percent).

r = discount rate.

n = # years since retirement computed so far.

E = Probability of dying during current year given that employee lived through previous year. This value comes from the GAR-94 table.

Note:  $(1 - E)$  = Probability of living through current year given that employee lived through previous year.

F = Probability of living through previous year given that employee lived through retirement.

Note: For a given year,  $F = \text{Previous year's } (1-E) * \text{Previous year's } F$ .

Applying this formula to the remaining years, the cumulative total for each year is:

Age 67:  $1.8367 + ((1.0241 / 1.0520^3) * (1 - 0.0122) * 0.9792) = 2.6875$ .  
Age 68:  $2.6875 + ((1.0364 / 1.0520^4) * (1 - 0.0128) * 0.9673) = 3.4956$ .  
Age 69:  $3.4956 + ((1.0489 / 1.0520^5) * (1 - 0.0138) * 0.9549) = 4.2621$ .  
Age 70:  $4.2621 + ((1.0615 / 1.0520^6) * (1 - 0.0144) * 0.9417) = 4.9889$ .  
Age 71:  $4.9889 + ((1.0742 / 1.0520^7) * (1 - 0.0155) * 0.9281) = 5.6772$ .  
Age 72:  $5.6772 + ((1.0871 / 1.0520^8) * (1 - 0.0168) * 0.9137) = 6.3282$ .  
Age 73:  $6.3282 + ((1.1001 / 1.0520^9) * (1 - 0.0181) * 0.8983) = 6.9431$ .  
Age 74:  $6.9431 + ((1.1133 / 1.0520^{10}) * (1 - 0.0195) * 0.8821) = 7.5231$ .  
Age 75:  $7.5231 + ((1.1267 / 1.0520^{11}) * (1 - 0.0218) * 0.8649) = 8.0689$ .  
Age 76:  $8.0689 + ((1.1402 / 1.0520^{12}) * (1 - 0.0236) * 0.8461) = 8.5816$ .  
Age 77:  $8.5816 + ((1.1539 / 1.0520^{13}) * (1 - 0.0268) * 0.8261) = 9.0615$ .  
Age 78:  $9.0615 + ((1.1677 / 1.0520^{14}) * (1 - 0.0306) * 0.8040) = 9.5091$ .  
Age 79:  $9.5091 + ((1.1818 / 1.0520^{15}) * (1 - 0.0351) * 0.7794) = 9.9246$ .  
Age 80:  $9.9246 + ((1.1959 / 1.0520^{16}) * (1 - 0.0403) * 0.7520) = 10.3082$ .  
Age 81:  $10.3082 + ((1.2103 / 1.0520^{17}) * (1 - 0.0461) * 0.7218) = 10.6602$ .  
Age 82:  $10.6602 + ((1.2248 / 1.0520^{18}) * (1 - 0.0526) * 0.6885) = 10.9810$ .  
Age 83:  $10.9810 + ((1.2395 / 1.0520^{19}) * (1 - 0.0570) * 0.6523) = 11.2719$ .  
Age 84:  $11.2719 + ((1.2544 / 1.0520^{20}) * (1 - 0.0644) * 0.6151) = 11.5338$ .  
Age 85:  $11.5338 + ((1.2694 / 1.0520^{21}) * (1 - 0.0694) * 0.5755) = 11.7683$ .  
Age 86:  $11.7683 + ((1.2847 / 1.0520^{22}) * (1 - 0.0750) * 0.5355) = 11.9769$ .  
Age 87:  $11.9769 + ((1.3001 / 1.0520^{23}) * (1 - 0.0856) * 0.4954) = 12.1604$ .  
Age 88:  $12.1604 + ((1.3157 / 1.0520^{24}) * (1 - 0.0983) * 0.4529) = 12.3196$ .  
Age 89:  $12.3196 + ((1.3315 / 1.0520^{25}) * (1 - 0.1075) * 0.4084) = 12.4563$ .  
Age 90:  $12.4563 + ((1.3475 / 1.0520^{26}) * (1 - 0.1237) * 0.3645) = 12.5715$ .  
Age 91:  $12.5715 + ((1.3636 / 1.0520^{27}) * (1 - 0.1347) * 0.3194) = 12.6674$ .  
Age 92:  $12.6674 + ((1.3800 / 1.0520^{28}) * (1 - 0.1545) * 0.2764) = 12.7454$ .  
Age 93:  $12.7454 + ((1.3965 / 1.0520^{29}) * (1 - 0.1677) * 0.2337) = 12.8078$ .

Age 94:  $12.8078 + ((1.4133 / 1.0520^{30}) * (1 - 0.1817) * 0.1945) = 12.8570.$   
 Age 95:  $12.8570 + ((1.4303 / 1.0520^{31}) * (1 - 0.2080) * 0.1592) = 12.8944.$   
 Age 96:  $12.8944 + ((1.4474 / 1.0520^{32}) * (1 - 0.2235) * 0.1261) = 12.9224.$   
 Age 97:  $12.9224 + ((1.4648 / 1.0520^{33}) * (1 - 0.2384) * 0.0979) = 12.9429.$   
 Age 98:  $12.9429 + ((1.4824 / 1.0520^{34}) * (1 - 0.2684) * 0.0746) = 12.9573.$   
 Age 99:  $12.9573 + ((1.5002 / 1.0520^{35}) * (1 - 0.2832) * 0.0545) = 12.9673.$   
 Age 100:  $12.9673 + ((1.5182 / 1.0520^{36}) * (1 - 0.2979) * 0.0391) = 12.9740.$   
 Age 101:  $12.9740 + ((1.5364 / 1.0520^{37}) * (1 - 0.3335) * 0.0275) = 12.9783.$   
 Age 102:  $12.9783 + ((1.5548 / 1.0520^{38}) * (1 - 0.3503) * 0.0183) = 12.9810.$   
 Age 103:  $12.9810 + ((1.5735 / 1.0520^{39}) * (1 - 0.3685) * 0.0119) = 12.9827.$   
 Age 104:  $12.9827 + ((1.5924 / 1.0520^{40}) * (1 - 0.3879) * 0.0075) = 12.9836.$   
 Age 105:  $12.9836 + ((1.6115 / 1.0520^{41}) * (1 - 0.4072) * 0.0046) = 12.9842.$   
 Age 106:  $12.9842 + ((1.6308 / 1.0520^{42}) * (1 - 0.4256) * 0.0027) = 12.9845.$   
 Age 107:  $12.9845 + ((1.6504 / 1.0520^{43}) * (1 - 0.4419) * 0.0016) = 12.9846.$   
 Age 108:  $12.9846 + ((1.6702 / 1.0520^{44}) * (1 - 0.4576) * 0.0009) = 12.9847.$   
 Age 109:  $12.9847 + ((1.6902 / 1.0520^{45}) * (1 - 0.4732) * 0.0005) = 12.9848.$   
 Age 110:  $12.9848 + ((1.7105 / 1.0520^{46}) * (1 - 0.4867) * 0.0002) = 12.9848.$   
 Age 111:  $12.9848 + ((1.7310 / 1.0520^{47}) * (1 - 0.4964) * 0.0001) = 12.9848.$   
 Age 112:  $12.9848 + ((1.7518 / 1.0520^{48}) * (1 - 0.5000) * 0.0001) = 12.9848.$   
 Age 113:  $12.9848 + ((1.7728 / 1.0520^{49}) * (1 - 0.5000) * 0.0000) = 12.9848.$   
 Age 114:  $12.9848 + ((1.7941 / 1.0520^{50}) * (1 - 0.5000) * 0.0000) = 12.9848.$   
 Age 115:  $12.9848 + ((1.8156 / 1.0520^{51}) * (1 - 0.5000) * 0.0000) = 12.9848.$   
 Age 116:  $12.9848 + ((1.8374 / 1.0520^{52}) * (1 - 0.5000) * 0.0000) = 12.9848.$   
 Age 117:  $12.9848 + ((1.8595 / 1.0520^{53}) * (1 - 0.5000) * 0.0000) = 12.9848.$   
 Age 118:  $12.9848 + ((1.8818 / 1.0520^{54}) * (1 - 0.5000) * 0.0000) = 12.9848.$   
 Age 119:  $12.9848 + ((1.9044 / 1.0520^{55}) * (1 - 0.5000) * 0.0000) = 12.9848.$   
 Age 120:  $12.9848 + ((1.9272 / 1.0520^{56}) * (1 - 1.0000) * 0.0000) = 12.9848.$

Thus, the mortality-weighted present value of a \$1 payment starting at retirement, as of retirement, for gender male = \$12.9848.

Calculating for UNISEX mortality (blended male/female mortality rate, not gender specific), using the GAR-94 Mortality Table as published in IRS Rev. Rul. 2001-62, adjusted for declines in mortality only to year 2002.

The discount (interest) rate is 5.20%.

The cost of living adjustment ("COLA") is 1.20%.

Employee's age at retirement is 65.

Age 65:  $0.0000 + ((1.0000 / 1.0520^1) * (1 - 0.0114) * 1.0000) = 0.9397.$   
 Age 66:  $0.9397 + ((1.0120 / 1.0520^2) * (1 - 0.0129) * 0.9886) = 1.8320.$   
 Age 67:  $1.8320 + ((1.0241 / 1.0520^3) * (1 - 0.0143) * 0.9758) = 2.6782.$   
 Age 68:  $2.6782 + ((1.0364 / 1.0520^4) * (1 - 0.0156) * 0.9619) = 3.4794.$   
 Age 69:  $3.4794 + ((1.0489 / 1.0520^5) * (1 - 0.0170) * 0.9469) = 4.2371.$   
 Age 70:  $4.2371 + ((1.0615 / 1.0520^6) * (1 - 0.0184) * 0.9308) = 4.9526.$   
 Age 71:  $4.9526 + ((1.0742 / 1.0520^7) * (1 - 0.0200) * 0.9137) = 5.6270.$   
 Age 72:  $5.6270 + ((1.0871 / 1.0520^8) * (1 - 0.0220) * 0.8954) = 6.2616.$   
 Age 73:  $6.2616 + ((1.1001 / 1.0520^9) * (1 - 0.0242) * 0.8756) = 6.8572.$   
 Age 74:  $6.8572 + ((1.1133 / 1.0520^{10}) * (1 - 0.0266) * 0.8545) = 7.4150.$   
 Age 75:  $7.4150 + ((1.1267 / 1.0520^{11}) * (1 - 0.0293) * 0.8317) = 7.9358.$   
 Age 76:  $7.9358 + ((1.1402 / 1.0520^{12}) * (1 - 0.0324) * 0.8074) = 8.4207.$   
 Age 77:  $8.4207 + ((1.1539 / 1.0520^{13}) * (1 - 0.0363) * 0.7812) = 8.8701.$   
 Age 78:  $8.8701 + ((1.1677 / 1.0520^{14}) * (1 - 0.0406) * 0.7529) = 9.2849.$

Age 79:  $9.2849 + ((1.1818 / 1.0520^{15}) * (1 - 0.0455) * 0.7223) = 9.6658.$   
 Age 80:  $9.6658 + ((1.1959 / 1.0520^{16}) * (1 - 0.0508) * 0.6894) = 10.0135.$   
 Age 81:  $10.0135 + ((1.2103 / 1.0520^{17}) * (1 - 0.0567) * 0.6544) = 10.3292.$   
 Age 82:  $10.3292 + ((1.2248 / 1.0520^{18}) * (1 - 0.0631) * 0.6173) = 10.6136.$   
 Age 83:  $10.6136 + ((1.2395 / 1.0520^{19}) * (1 - 0.0695) * 0.5784) = 10.8682.$   
 Age 84:  $10.8682 + ((1.2544 / 1.0520^{20}) * (1 - 0.0765) * 0.5382) = 11.0944.$   
 Age 85:  $11.0944 + ((1.2694 / 1.0520^{21}) * (1 - 0.0841) * 0.4970) = 11.2937.$   
 Age 86:  $11.2937 + ((1.2847 / 1.0520^{22}) * (1 - 0.0927) * 0.4552) = 11.4677.$   
 Age 87:  $11.4677 + ((1.3001 / 1.0520^{23}) * (1 - 0.1030) * 0.4130) = 11.6178.$   
 Age 88:  $11.6178 + ((1.3157 / 1.0520^{24}) * (1 - 0.1144) * 0.3705) = 11.7456.$   
 Age 89:  $11.7456 + ((1.3315 / 1.0520^{25}) * (1 - 0.1269) * 0.3281) = 11.8530.$   
 Age 90:  $11.8530 + ((1.3475 / 1.0520^{26}) * (1 - 0.1407) * 0.2864) = 11.9418.$   
 Age 91:  $11.9418 + ((1.3636 / 1.0520^{27}) * (1 - 0.1547) * 0.2461) = 12.0140.$   
 Age 92:  $12.0140 + ((1.3800 / 1.0520^{28}) * (1 - 0.1702) * 0.2081) = 12.0716.$   
 Age 93:  $12.0716 + ((1.3965 / 1.0520^{29}) * (1 - 0.1866) * 0.1727) = 12.1167.$   
 Age 94:  $12.1167 + ((1.4133 / 1.0520^{30}) * (1 - 0.2035) * 0.1404) = 12.1513.$   
 Age 95:  $12.1513 + ((1.4303 / 1.0520^{31}) * (1 - 0.2221) * 0.1119) = 12.1771.$   
 Age 96:  $12.1771 + ((1.4474 / 1.0520^{32}) * (1 - 0.2402) * 0.0870) = 12.1960.$   
 Age 97:  $12.1960 + ((1.4648 / 1.0520^{33}) * (1 - 0.2594) * 0.0661) = 12.2095.$   
 Age 98:  $12.2095 + ((1.4824 / 1.0520^{34}) * (1 - 0.2789) * 0.0490) = 12.2188.$   
 Age 99:  $12.2188 + ((1.5002 / 1.0520^{35}) * (1 - 0.2976) * 0.0353) = 12.2251.$   
 Age 100:  $12.2251 + ((1.5182 / 1.0520^{36}) * (1 - 0.3166) * 0.0248) = 12.2293.$   
 Age 101:  $12.2293 + ((1.5364 / 1.0520^{37}) * (1 - 0.3388) * 0.0169) = 12.2319.$   
 Age 102:  $12.2319 + ((1.5548 / 1.0520^{38}) * (1 - 0.3588) * 0.0112) = 12.2335.$   
 Age 103:  $12.2335 + ((1.5735 / 1.0520^{39}) * (1 - 0.3807) * 0.0072) = 12.2345.$   
 Age 104:  $12.2345 + ((1.5924 / 1.0520^{40}) * (1 - 0.4044) * 0.0044) = 12.2351.$   
 Age 105:  $12.2351 + ((1.6115 / 1.0520^{41}) * (1 - 0.4279) * 0.0026) = 12.2354.$   
 Age 106:  $12.2354 + ((1.6308 / 1.0520^{42}) * (1 - 0.4491) * 0.0015) = 12.2355.$   
 Age 107:  $12.2355 + ((1.6504 / 1.0520^{43}) * (1 - 0.4660) * 0.0008) = 12.2356.$   
 Age 108:  $12.2356 + ((1.6702 / 1.0520^{44}) * (1 - 0.4786) * 0.0004) = 12.2357.$   
 Age 109:  $12.2357 + ((1.6902 / 1.0520^{45}) * (1 - 0.4881) * 0.0002) = 12.2357.$   
 Age 110:  $12.2357 + ((1.7105 / 1.0520^{46}) * (1 - 0.4948) * 0.0001) = 12.2357.$   
 Age 111:  $12.2357 + ((1.7310 / 1.0520^{47}) * (1 - 0.4987) * 0.0001) = 12.2357.$   
 Age 112:  $12.2357 + ((1.7518 / 1.0520^{48}) * (1 - 0.5000) * 0.0000) = 12.2357.$   
 Age 113:  $12.2357 + ((1.7728 / 1.0520^{49}) * (1 - 0.5000) * 0.0000) = 12.2357.$   
 Age 114:  $12.2357 + ((1.7941 / 1.0520^{50}) * (1 - 0.5000) * 0.0000) = 12.2357.$   
 Age 115:  $12.2357 + ((1.8156 / 1.0520^{51}) * (1 - 0.5000) * 0.0000) = 12.2357.$   
 Age 116:  $12.2357 + ((1.8374 / 1.0520^{52}) * (1 - 0.5000) * 0.0000) = 12.2357.$   
 Age 117:  $12.2357 + ((1.8595 / 1.0520^{53}) * (1 - 0.5000) * 0.0000) = 12.2357.$   
 Age 118:  $12.2357 + ((1.8818 / 1.0520^{54}) * (1 - 0.5000) * 0.0000) = 12.2357.$   
 Age 119:  $12.2357 + ((1.9044 / 1.0520^{55}) * (1 - 0.5000) * 0.0000) = 12.2357.$   
 Age 120:  $12.2357 + ((1.9272 / 1.0520^{56}) * (1 - 1.0000) * 0.0000) = 12.2357.$

Thus, the mortality-weighted present value of a \$1 payment starting at retirement, as of retirement, for gender unisex = \$12.2357.

Calculating mortality-weighted present value discount factor retirement back to the evaluation date.

Calculating for gender MALE, using the GAR-94 Mortality Table, adjusted for projected

declines in mortality.

Employee's age at evaluation date is 46.92 years .

The number of full years to discount is the age at retirement (65) minus age at evaluation date (46) minus 1, which equals 18.

The fractional year from the evaluation date to the employee's next birthday is  $46.92 - 46 = 0.08$ .

The discount rate (interest rate) is 5.20%.

Calculating present value (not yet accounting for mortality):

The present value of a \$1 payment made at retirement (65) discounted the number of full years is calculated as:  $1/(1+r)^n$ , where  $r$ =discount rate and  $n$ =# of full years. The ^ symbol means "raised to the power of."

This calculates to  $1/(1+0.05)^{18} = 0.4015$ .

Discounting this value for the fractional year to the next birthday, we get  $0.4015 * 1 / (1+0.05)^{0.08} = 0.4000$ .

Calculating the further discount for mortality:

Start with the probability that employee lives to his or her next birthday.

This is  $(1 - \text{the probability that he or she dies before the next birthday})$ .

The probability that he or she dies before the next birthday is, approximately: fraction of year remaining to next birthday \* probability he or she dies during this year given that he or she was alive at the beginning of the year.

The probability of dying during the year if alive at the beginning for a person of gender male age 46 is (from the GAR-94 mortality tables) 0.0015.

The probability that employee lives to his or her next birthday is thus

$1 - (0.08 * 0.0015) = 0.9999$ .

Continue through retirement:

The probability of living through a particular year given that one is alive today is calculated as:

the probability of living through the previous year \*  $(1 - \text{probability of dying during the particular year given that one lived through the previous year})$ .

Probability of living to age 47 =  $0.9999 * (1 - 0.0016) = 0.9983$ .

Probability of living to age 48 =  $0.9983 * (1 - 0.0018) = 0.9965$ .

Probability of living to age 49 =  $0.9965 * (1 - 0.0019) = 0.9946$ .

Probability of living to age 50 =  $0.9946 * (1 - 0.0020) = 0.9926$ .

Probability of living to age 51 =  $0.9926 * (1 - 0.0022) = 0.9904$ .

Probability of living to age 52 =  $0.9904 * (1 - 0.0024) = 0.9881$ .

Probability of living to age 53 =  $0.9881 * (1 - 0.0026) = 0.9855$ .

Probability of living to age 54 =  $0.9855 * (1 - 0.0028) = 0.9827$ .

Probability of living to age 55 =  $0.9827 * (1 - 0.0031) = 0.9796$ .

Probability of living to age 56 =  $0.9796 * (1 - 0.0035) = 0.9762$ .

Probability of living to age 57 =  $0.9762 * (1 - 0.0040) = 0.9723$ .

Probability of living to age 58 =  $0.9723 * (1 - 0.0045) = 0.9680$ .

Probability of living to age 59 =  $0.9680 * (1 - 0.0050) = 0.9632$ .

Probability of living to age 60 =  $0.9632 * (1 - 0.0055) = 0.9578$ .

Probability of living to age 61 =  $0.9578 * (1 - 0.0063) = 0.9519$ .

Probability of living to age 62 =  $0.9519 * (1 - 0.0070) = 0.9452$ .

Probability of living to age 63 =  $0.9452 * (1 - 0.0080) = 0.9377$ .

Probability of living to age 64 =  $0.9377 * (1 - 0.0088) = 0.9294$ .

The probability of living to retirement, given that

the employee is alive at the evaluation date is thus 0.9294.  
To obtain the mortality-weighted present value discount factor, multiply  
the non-mortality present value factor \* the probability of living to  
retirement, given that the employee is alive  
at the evaluation date.

The mortality-weighted present value discount factor from  
retirement back to Evaluation Date is thus  $0.4000 * 0.9294$   
 $= 0.3717$ .

Calculating mortality-weighted present value discount factor  
retirement back to the evaluation date.

Calculating for UNISEX mortality (blended male/female mortality rate, not  
gender specific), using the GAR-94 Mortality Table as published in IRS  
Rev. Rul. 2001-62, adjusted for declines in mortality only to year 2002.

Employee's age at evaluation date is 46.92 years .

The number of full years to discount is the age at retirement (65) minus age  
at evaluation date (46) minus 1, which equals 18.

The fractional year from the evaluation date to the employee's next  
birthday is  $46.92 - 46 = 0.08$ .

The discount rate (interest rate) is 5.20%.

Calculating present value (not yet accounting for mortality):

The present value of a \$1 payment made at retirement (65) discounted the number of full years is calculated as:  $1/(1+r)^n$ ,  
where  $r$ =discount rate and  $n$ =# of full years. The ^ symbol means  
"raised to the power of."

This calculates to  $1/(1+0.05)^{18} = 0.4015$ .

Discounting this value for the fractional year to the next birthday, we get  
 $0.4015 * 1 / (1+0.05)^{0.08} = 0.4000$ .

Calculating the further discount for mortality:

Start with the probability that employee lives to his or her next birthday.

This is (1 - the probability that he or she dies before the next birthday).

The probability that he or she dies before the next birthday is, approximately:  
fraction of year remaining to next birthday \* probability he or she dies  
during this year given that he or she was alive at the beginning of the  
year.

The probability of dying during the year if alive at the beginning for a  
person of gender unisex age 46 is (from the GAR-94 mortality tables) 0.0013.

The probability that employee lives to his or her next birthday is thus  
 $1 - (0.08 * 0.0013) = 0.9999$ .

Continue through retirement:

The probability of living through a particular year given that one is alive  
today is calculated as:

the probability of living through the previous year \* (1 - probability of  
dying during the particular year given that one lived through the previous  
year).

Probability of living to age 47 =  $0.9999 * (1 - 0.0014) = 0.9985$ .

Probability of living to age 48 =  $0.9985 * (1 - 0.0016) = 0.9969$ .

Probability of living to age 49 =  $0.9969 * (1 - 0.0017) = 0.9952$ .

Probability of living to age 50 =  $0.9952 * (1 - 0.0019) = 0.9934$ .

Probability of living to age 51 =  $0.9934 * (1 - 0.0021) = 0.9913$ .  
Probability of living to age 52 =  $0.9913 * (1 - 0.0023) = 0.9890$ .  
Probability of living to age 53 =  $0.9890 * (1 - 0.0026) = 0.9865$ .  
Probability of living to age 54 =  $0.9865 * (1 - 0.0029) = 0.9837$ .  
Probability of living to age 55 =  $0.9837 * (1 - 0.0032) = 0.9805$ .  
Probability of living to age 56 =  $0.9805 * (1 - 0.0036) = 0.9770$ .  
Probability of living to age 57 =  $0.9770 * (1 - 0.0041) = 0.9730$ .  
Probability of living to age 58 =  $0.9730 * (1 - 0.0047) = 0.9684$ .  
Probability of living to age 59 =  $0.9684 * (1 - 0.0053) = 0.9632$ .  
Probability of living to age 60 =  $0.9632 * (1 - 0.0061) = 0.9574$ .  
Probability of living to age 61 =  $0.9574 * (1 - 0.0069) = 0.9507$ .  
Probability of living to age 62 =  $0.9507 * (1 - 0.0078) = 0.9433$ .  
Probability of living to age 63 =  $0.9433 * (1 - 0.0090) = 0.9348$ .  
Probability of living to age 64 =  $0.9348 * (1 - 0.0102) = 0.9253$ .

The probability of living to retirement, given that the employee is alive at the evaluation date is thus 0.9253.

To obtain the mortality-weighted present value discount factor, multiply the non-mortality present value factor \* the probability of living to retirement, given that the employee is alive at the evaluation date.

The mortality-weighted present value discount factor from retirement back to Evaluation Date is thus  $0.4000 * 0.9253 = 0.3701$ .

Calculating present value as of Retirement Date:

Present value, as of Retirement, is calculated as: monthly benefit \* 12 months/yr. \* discount factor as of retirement.

This is:  $\$317.00 * 12 * \$12.9848 = \$49,394.18$ .

For a unisex calculation, present value, as of Retirement, is monthly benefit \* 12 \* unisex discount factor as of retirement.

This is:  $\$317.00 * 12 * \$12.2357 = \$46,544.58$ .

Calculating the mortality-weighted present value as of the Evaluation Date.

To get this, multiply present value as of Retirement Date \* the mortality-weighted factor that discounts from the Retirement Date back to the present (the Evaluation Date).

Thus, the present value, weighted for mortality, is:  $\$49,394.18 * 0.3717 = \$18,362$ .

On a unisex basis, this calculation is:  $\$46,544.58 * 0.3701 = \$17,227$ .

Computing the coverture fraction for pension value being computed assuming employment as of "cut-off" date (typically separation date):

Coverature is the fraction of the pension's value that accrued during the marriage.

The numerator is the number of days the employee was employed during the marriage.

The denominator is the total number of days employed until the earliest of the cut-off date, the earliest retirement date, or the regular retirement date.

The coverture numerator is the number of days from (in MM/DD/YYYY format) 7/7/1987 to 5/5/2003, which is 5,781.

The coverture denominator is the number of days from (in MM/DD/YYYY format) 3/2/1980 to 5/5/2003, which is 8,464.

The coverture fraction is  $5,781 / 8,464 = 0.6830$ .

Computing the marital portion:

The marital portion is the present value of the portion of the pension accrued during the marriage.

This is the present value as of evaluation date \* the coverture fraction

For this gender, the marital portion is  $\$18,362 * 0.6830 = \$12,541$ .

For a unisex calculation, the marital portion is  $\$17,227 * 0.6830 = \$11,766$ .