

**Preliminary Report on the Impact on Older Employees of Amending the  
Defined Benefit Retirement Plan to the Cash Balance Pension**

In re:

Wade. E. Jensen and Donald D. Goff, individually and on behalf of all others similarly situated,  
v. Solvay Chemicals, Inc., Solvay America, Inc., Solvay America Companies Pension Plan.

Civil Action No. 06-CV-273 (ABJ/WCB)

United States District Court  
for the District of Wyoming

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## 1. Introduction and Summary of Findings

This report is a preliminary analysis of the impact on older employees of Solvay's transition from the Defined Benefit Retirement Plan to the Cash Balance Pension (CBP) from 2005 to date.

- Section 1 contains the Introduction and a Summary of Findings.
- Section 2 describes the factors impacting benefits for employees during the transition between plans and explains the specific mechanisms through which the transition impacted older employees.
- Section 3 provides a graphical analysis of the elevated wear-away for older employees.
- Section 4 tabulates the potential and actual damages from the periods of wear-away after the CBP changes.
- Section 5 tabulates the reductions in benefit accruals that resulted from the plan transition.
- Section 6 provides a conclusion.
- Section 7 lists the sources of data used in the report.
- Section 8 addresses my qualifications and compensation.

### Context of the Analysis

This is a class action under the Employee Retirement Income Security Act of 1974, as amended ("ERISA"), 29 U.S.C. § 1001 et seq., and a representative action under the Age Discrimination in Employment Act of 1967, as amended (the "ADEA"), 29 U.S.C. § 621 et seq. Plaintiffs claim that defendants have violated the ADEA and ERISA by amending a defined benefit retirement plan in a manner that freezes the benefits of older, longer-service employees during a "wear-away" period, and thereby provides no additional benefits during that period.<sup>1</sup> Plaintiffs also claim that the cash balance formula significantly reduces future retirement benefits for all employees, especially older employees, without adequate disclosure to employees of the reductions. I have been retained by the plaintiffs to analyze the benefit reductions and periods of wear-away and conduct statistical analyses of the impact of age on wear-aways in the retirement benefits of the class.

This analysis of wear-away and other impacts of the plan transition relies on two sources of data provided by defendants. Spreadsheets and an Access database were produced, providing detailed pension records for 3,680 Solvay employees, including 884 opt-in class members.<sup>2</sup> Of the 3,680 employees, 207 had a different pension formula from their previous employment at Ausimont until January 1, 2003. Results for the Ausimont employees are reported separately in some analyses. A group of 474 longer-term employees were offered the option of remaining in the prior plan (which

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<sup>1</sup>Class Action Complaint, page 1.

<sup>2</sup>Of individuals on the collective action list, 916 opted-in as plaintiffs, but 32 were not included in the data provided.

Solvay described as “grandfather eligible”), and 349 of them elected this option. The 349 are not included in any analyses with other employees.

The data provided were sufficient to calculate wear-aways and benefit reductions for most employees.<sup>3</sup> The data from these sources was combined and used to calculate the wear-away period and benefit reductions resulting from the plan transition using spreadsheet calculators produced by actuary Claude Poulin. The data compiled from these sources and the individual results of all the computations are included in electronic Attachment 1 (which contains personal identifiers subject to the Protective Order and therefore is to be treated as confidential filed under seal).

### Summary of Findings

The results of this study demonstrate that the conversion to the CBP by defendants dramatically reduced the future retirement benefits of all employees and resulted in substantially higher losses in benefits for older employees. My central findings are:

1. While all employees were negatively impacted by the change to a cash balance plan, the plan is structured in such a way that older employees are more negatively impacted by the plan conversion than are younger employees.
2. Older employees spend on average a longer time accruing no additional benefits (*wear-away* period) than do younger employees, resulting in an adverse impact on older workers.
3. Age impacts the length of the wear-away period both directly through structural features of the plans and indirectly, by means of its strong relationship with all the other factors that impact the length of the wear-away period.
4. When the lost benefits from the periods of wear-away are added to the reductions in benefit accruals resulting from the CBP design, on average all employees lose substantial benefits. Older employees suffer much larger losses than younger employees.
5. Solvay could have foreseen the impacts of the plan conversion on all employees, and the disparate impact on older workers using information available at that time, and therefore could have modified the plan design in order to reduce those impacts.
6. If multivariate regression is used, the statistical significance of the effect of age on wear-away is found to be so extreme (29 standard deviations) that it rules out the possibility that the impact is due to chance. Likewise the impact of age on potential damages (16 standard deviations) and actual damages (17 standard deviations) confirm the probative value of the age disparity in damages.
7. Losses in future benefits as a result of wear away are quite steep for all but the youngest employees. For example, employees who were between 50 and 55 will suffer on average \$21,752 in potential damages due to wear away.

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<sup>3</sup>There was adequate information to perform computations for 3,328 of the 3,680 employees.  
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8. Of actual damages from wear aways, 90 percent of potential and 83 percent of actual damages were borne by older employees.

These findings provide strong evidence that older employees suffered a systematic cessation in earning additional retirement benefits as a result of the pension plan transition that Solvay designed and implemented and that all employees, but again especially older employees, suffered substantial reductions in future retirement benefits from the cash balance design.

## **2. Transition to Solvay Cash Balance Plan**

Effective January 1, 2005, Solvay converted its traditional defined benefit pension plan into a “cash balance” plan. A cash balance plan attempts to mimic the behavior of a defined contribution plan, even though it is still regulated as a type of defined benefit plan. Employees under a cash balance plan have an “account balance” which is expressed as a dollar amount. The accounts were established with opening balances derived in part from the traditional accrued benefits. The initial balance failed to include the full value of the substantial early retirement benefits and exacted a discount for “pre-retirement mortality” that is never re-credited. In addition, the interest rates implicit in the conversion factors adopted by Solvay are higher than subsequent interest credit and conversion rates, resulting in further losses when the account balances are reconverted to annuity form.

For many employees, the opening value of the cash balance plan was substantially lower than the value of the prior plan benefit. Benefit accruals in the cash balance account are made through hypothetical pay credits, which are a function of age and compensation up to and over the Social Security Wage Base. Interest credits are established for each year. In contrast, the prior plan benefit was “frozen” at its amount at the time of transition. Employees retiring after the transition would receive the benefit derived from the higher of the two formulas. This type of transition plan is denoted a “greater-of” plan. Since the cash balance plan account value was lower for many employees, it would not be used in computing the actual benefit until it caught up. This “greater-of” transition results in a period of years during which the value of the actual retirement benefit ceases to grow at all. This phenomenon is called “wear-away.” Generally speaking, the duration of the wear-away period will increase as a function of the size of the gap between the cash account value and the value of the frozen benefit and the rate at which the employee is catching up. This phenomenon could be avoided by using an “A plus B” transition in which the cash balance credits are added to the frozen benefits.

The report of Actuary Claude Poulin details the design of Solvay’s “greater-of” transition plan.<sup>4</sup> By its construction this plan systematically subjected older employees to longer wear-away periods and greater losses of future benefits. Mr. Poulin describes alternative “A plus B” or “sum of” designs for plan transitions which are routinely used to avoid subjecting older employees to greater wear-away and damages. In fact, Mr. Poulin points out that the “A plus B” transition plan is statutorily required for all cash balance conversions after June 2005 by the 2006 Pension Protection Act.<sup>5</sup>

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<sup>4</sup>Claude Poulin Declaration, ¶30-37.

<sup>5</sup>Claude Poulin Declaration, ¶29, citing P. L. 109-280, Section 701(a) (adding ERISA Section 204(b)(5)(B)(ii)-(iv)).

The “greater-of” design of the Solvay transition is one prerequisite for the existence of wear-aways. The second precondition is that the value of the frozen benefit under the prior plan is greater than the value of the cash balance account, which requires a wear-away period for the cash account to catch up to the value of the frozen benefit.

In addition to the designed-in wear-aways, the cash balance plan that Solvay adopted reduced benefit accruals substantially relative to the prior benefit formula. Mr. Poulin has calculated that the rate of accruals is substantially lower going forward, for example, 0.7 percent of highest pay compared with 1.1 percent for plaintiff Wade Jensen.<sup>6</sup> As detailed in Section 5, the average future monthly retirement benefit is severely reduced relative to the prior plan for all employees, including those who do not suffer wear-away.

### **Design of the Transition Resulted in Systematic Impact on Older Employees**

The Solvay transition included features which in combination with the greater-of formulation guaranteed that the burden of these negative impacts are borne disproportionately by older workers. Three factors detailed in Mr. Poulin’s declaration caused the greater impact on older employees:<sup>7</sup>

- Solvay excluded the value of previously-earned early retirement benefits, which was greater for older employees because of their proximity to retirement, and it applied a pre-retirement mortality discount that is steeper at older ages.
- Conversion factors used by Solvay to determine cash balances were based on higher discount rates for older employees than the interest credits subsequently applied. The effect of these conversion factors in combination with the exclusion of early retirement benefits was to reduce their initial accounts as much as 50 percent relative to the value of the prior plan’s benefits.
- Monthly benefits under the new plan are also reduced relative to the prior plan. Accruals for older employees are reduced more. This results in more years of wear-away before the value of the cash balance plan reaches parity with the prior plan and substantially lower retirement benefit accruals even after the period of wear-away ends.

The fact that these disproportionate impacts are built into the structure of the plan indicates that they were not random, nor would they have been unexpected. At any time prior to implementing the new plan, an analyst with the details of the plan and a few basic assumptions could have estimated the impact on Solvay employees and recognized that the impact would be borne primarily by older workers.

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<sup>6</sup>Claude Poulin Declaration, ¶17-26.

<sup>7</sup>Claude Poulin Declaration, ¶27-41.

### 3. Wear-Away Duration Strongly Associated with Age

#### Calculation of Wear-Away

The plaintiffs have retained actuary Claude Poulin, who has made a detailed analysis of the former and new benefit plans sponsored by Solvay.<sup>8</sup> Mr. Poulin produced three spreadsheet calculators that were used in our analyses of wear-aways and benefit reductions. Each spreadsheet computed values for a different analysis: (1) potential wear-away and damages and actual length of wear-away damages; (2) reduction in future benefits at age 55; and (3) reduction in future benefits at age 65.

In most instances of putative employment discrimination, the only way to determine whether employment decisions have a discriminatory impact is through observing the impact on employees. This case is different. The impact of the plan transition is *predetermined* and can be *calculated* from the age, prior plan benefit amount and salary. Therefore, we can evaluate the *systematic impact resulting from the design of the plan transition*. In other words, we know from its construction that the plan transition was not age neutral. The impact was known by defendants in advance of implementation. The monetary losses to the putative class could be calculated in advance, resulting in a substantial reduction in pension expenses on defendants' financial statements.

#### Many Older Employees Leave Without Ever Earning Benefits Again

Using Mr. Poulin's spreadsheets, we report the potential and actual wear-away period computed under the cash balance plan. This wear-away period is the number of years during which the cash balance account is less than the now frozen monthly benefit under the prior plan. By their early 60s wear-away terminates for all employees, and the benefit accruals would resume. However, since few employees remain at Solvay into their 60s, most older employees will never recommence earning benefits after wear-away.

To analyze the full impact of the wear-away established by the plan transition, the potential wear-away is reported as well as the actual damages from wear-away. Potential wear-away is the number of years before the employee would begin earning benefits again if the employee continued to be employed. The actual damages from wear-away are the damages that employees have suffered to date from the wear-away design when actual salaries and actual pay and interest credits are used.

#### Potential Wear-Away Increases with Age

The existence and length of the expected wear-away can be calculated from five values for each employee: age, service, 2004 salary, opening cash balance account balance, and the Frozen Accrued Benefit. Applying Solvay's pension data to the spreadsheet developed by Mr. Poulin demonstrates convincingly that the duration of the wear-away period and resulting losses of future benefits are strongly associated with age. During the wear-away period, employees are accruing no additional benefits. Older employees spend on average a longer time accruing no additional benefits than do younger employees, resulting in an adverse impact on older workers.

Chart 1 compares the average potential wear-away duration for employees 40 and over to younger employees for former Ausimont employees, non-Ausimont employees, and both combined. This

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<sup>8</sup>Claude Poulin Declaration, ¶7-16.  
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chart shows the strong relationship between age and length of wear-away, and the sizeable impact on older employees. The pattern is the same for each grouping of employees. For all employees, the transition resulted in employees 40 and over waiting on average over 3.2 years while they earned no additional benefits, versus under 1.1 years on average for employees under 40. Therefore older employees had on average 279 percent the potential wear-away of younger employees.

**Chart 1: Duration of Potential Wear-Away By Employee Age**

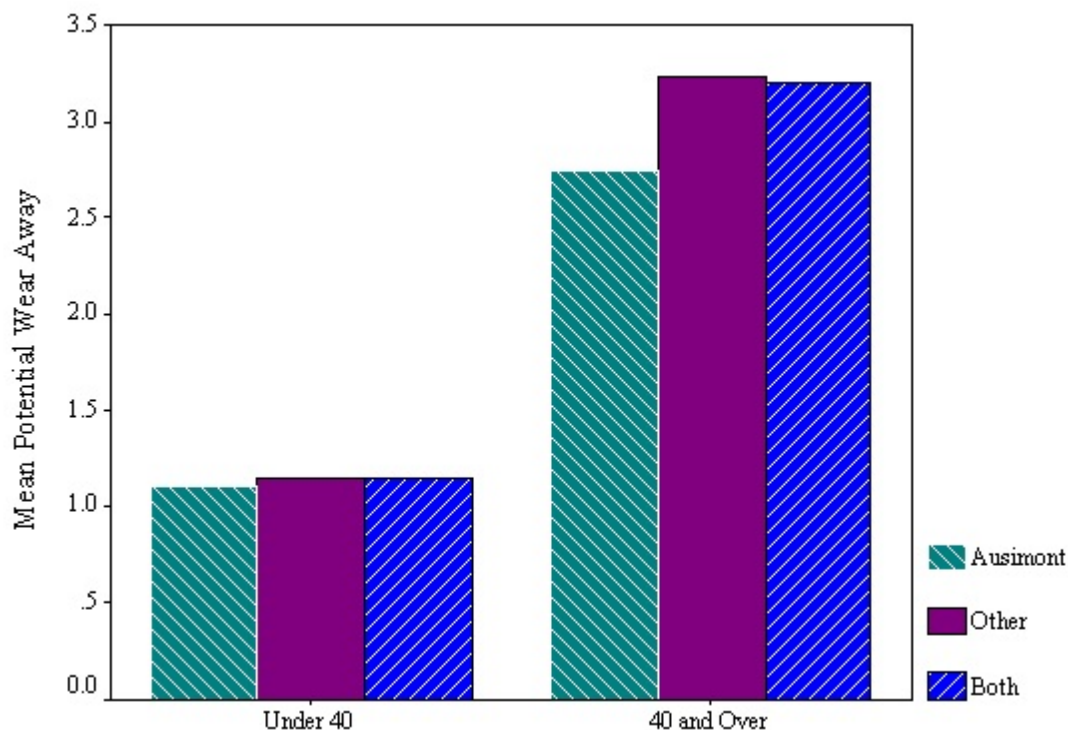
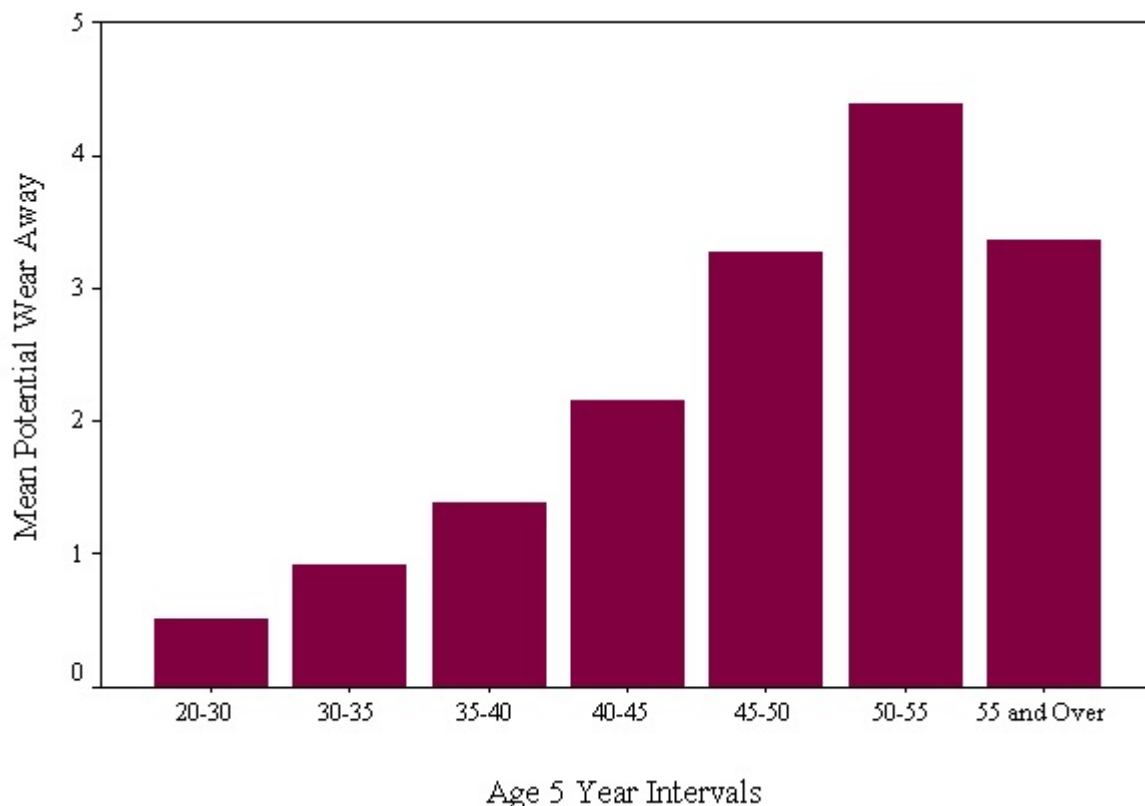


Chart 2 shows that, except for the truncation of wear-away as employees near retirement age, age is strongly related to longer wear-away periods. For every five year increase in the employee's age, the potential wear-away period on average becomes almost one year longer.

The impact gradually starts to decline between ages 55 and 60. But Solvay's payroll and pension data show that very few employees work many years past 60. In fact, only 7 percent of the active participants in Solvay's Plan are over age 60, and almost half of them were grandfathered in under the prior plan (57 of 124).

**Chart 2: Duration of Potential Wear-Away by Five-Year Age Intervals**

### **Almost All Employees with Many Years of Wear Away Are Older**

A simple statistic captures how much of the brunt of wear away is borne by older employees. There are 592 employees with four or more years of wear away, representing almost 18 percent of employees. Yet of this sizeable group *only three percent is under 40*, and over 50 percent are over 50 years old.

### **Age Is a Central Determinant of Wear-Away**

The existence and length of wear-away can be calculated from five values for each employee: age, service, 2004 salary, opening cash balance account balance, and the Frozen Accrued Benefit. Age is positively correlated with years of wear-away: as age increases, the years of wear-away also increase. Service is a factor not only through its impact on the amount of the Frozen Accrued Benefit, but also through the cash balance accrual rate. Service, salary, cash balance account, and the amount of the prior benefits are all positively correlated with age: as age increases, each of these tends to increase.

Since these factors are all positively correlated with age, the age of employees has a strong impact on the existence and length of wear-away. Age is the necessary antecedent of higher values of the other variables. As such, age is the necessary if not sufficient condition through which any of them impacts wear-away. This relationship between age and the other variables means that each of these variables will mediate the impact of age, tending to act as a proxy for age in their impact on wear-

away.

For example, while an employee age 50 can have 25 years of service, it is impossible for an employee who is age 30 or 40 to have that many years of service. Similarly the level of the now-frozen benefits that could be acquired by an employee of age 50 would be unachievable for a 30 or 40 year old employee.

### **Multivariate Regression is Not Needed to Understand the Impact of Age on Wear-Away**

In this case there is no need to use statistical tools like correlation analysis or multivariate regression. These tools are designed to investigate patterns that are not already known. For example, multivariate regression estimates the way each of a group of factors impacts an outcome. These tools are inappropriate in this case, since *we already know the precise relationship between each of the factors and wear-away*. We can use a tool like Mr. Poulin's spreadsheets to *compute* the impact of age on wear-away. There is no need to estimate the impact.

In any case, regression analysis does show the key role of age in lengthening the period of wear-away for older employees. This is a strong relationship because the underlying relationship between age and wear-away was built into the transition plan by defendants.

Multivariate regression evaluates the size of the effect of age on wear-away, while controlling for other variables. Age is found to be a primary and statistically significant factor in length of wear-away. A regression model including all the variables used in Mr. Poulin's calculations of wear-away<sup>9</sup> indicates that wear-away for employees is affected by their age, and that the impact is statistically significant at the levels far exceeding the prima facie threshold of 0.05. In fact, the statistical significance of the effect of age on wear-away is so extreme that it rules out that the impact is due to chance. The age disparity in potential wear-away was 29 standard deviations. To illustrate, consider that the likelihood that age is not a factor in the length of actual wear-away is less than one-fifth your chance of winning the six number lottery with one ticket.<sup>10</sup>

If age were not a significant factor in wear-away, we would expect that controlling for other factors would reduce the age effect to statistical insignificance. But here, controlling for the significant effects of other variables leaves a highly significant effect of age.

## **4. Damages from Wear Away Fall Primarily on Older Employees**

### **Damages Calculations Reveal Older Employees Suffered Over 90% of Wear Away Losses**

Mr. Poulin also produced spreadsheets which calculate the potential and actual damages resulting

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<sup>9</sup>The model employed a multivariate linear regression with the dependent variable the potential wear away computed by Mr. Poulin's calculators. Independent variables were age on February 8, 2008, service, 2004 salary (to project future salary), cash balance account value and the frozen prior benefit.

<sup>10</sup>Two additional regression models were analyzed, with the same independent variables, and the dependent variable replaced by potential and actual damages from Mr. Poulin's calculators. These models demonstrated statistically significant impacts of age of 16 (potential damages) and 17 (actual damages) standard deviations.

from wear-away. Since elevated wear away is age-related, the damages resulting from wear away are relevant to plaintiffs' claims of age discrimination. These damage calculations do not include the losses due to reduced rates of benefit accrual under the cash balance plan. The losses due to reduced accrual rates are examined in Section 4.

The spreadsheets Mr. Poulin developed calculate damages for each individual employee as a result of wear away caused by the transition to the CBP.<sup>11</sup> As employees continue to work after the date of transition to the cash balance plan, most experience some period of time during which they do not accrue any benefits due to the wear-away effects discussed previously. Pay and interest credits are allocated to their cash balance account but those pay and interest credits do not translate to any real additional retirement benefit. When the wear-away period ends, the employees may begin to accrue benefits again, but at a slower rate than under the previous plan. This section compares average potential and actual damages due to wear away by age.

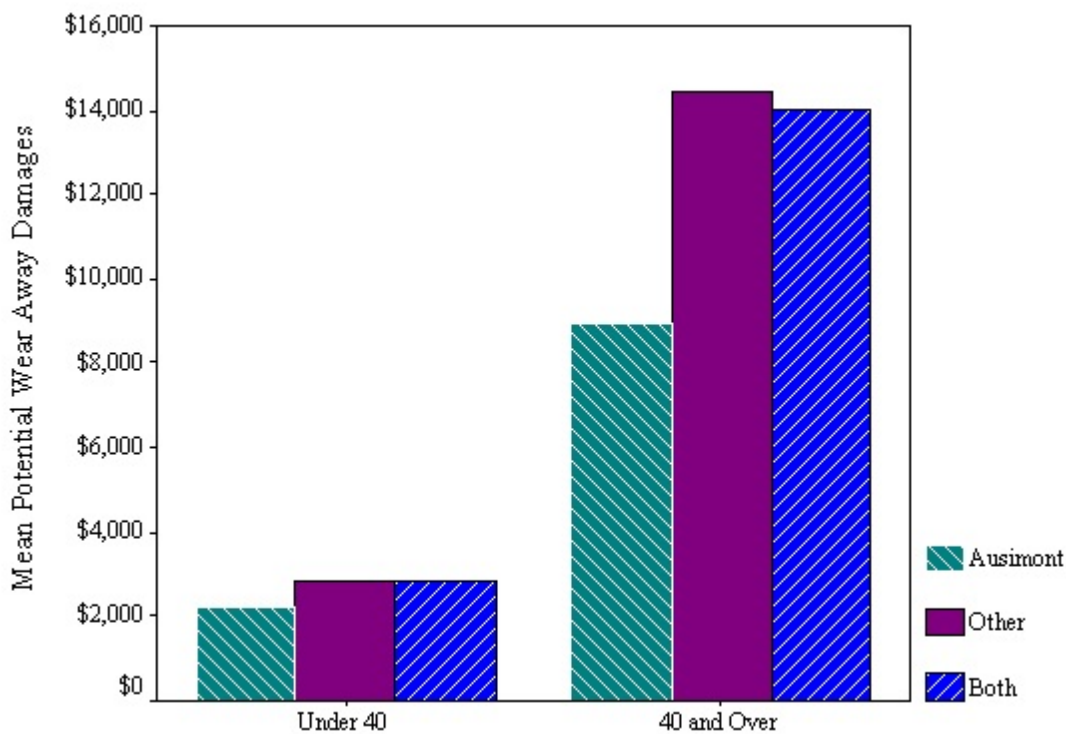
### **Potential Damages from Wear Away Disproportionately Impact Older Employees**

As with potential wear-away, potential damages reflect the losses that an employee at Solvay would see if he or she continued to work until retirement. Damage calculations are presented based on wear aways of age 55 or over benefits. My analysis also demonstrates that older employees suffered substantially greater losses.

The average loss in potential benefits by age group is shown in Chart 3. The losses are quite steep on average for all employees. However, Chart 3 shows that the losses were much more severe for older employees. This chart shows that older employees' damages were \$14,031, five times the \$2,822 average damages for younger employees. The pattern is similar for all groups of employees.

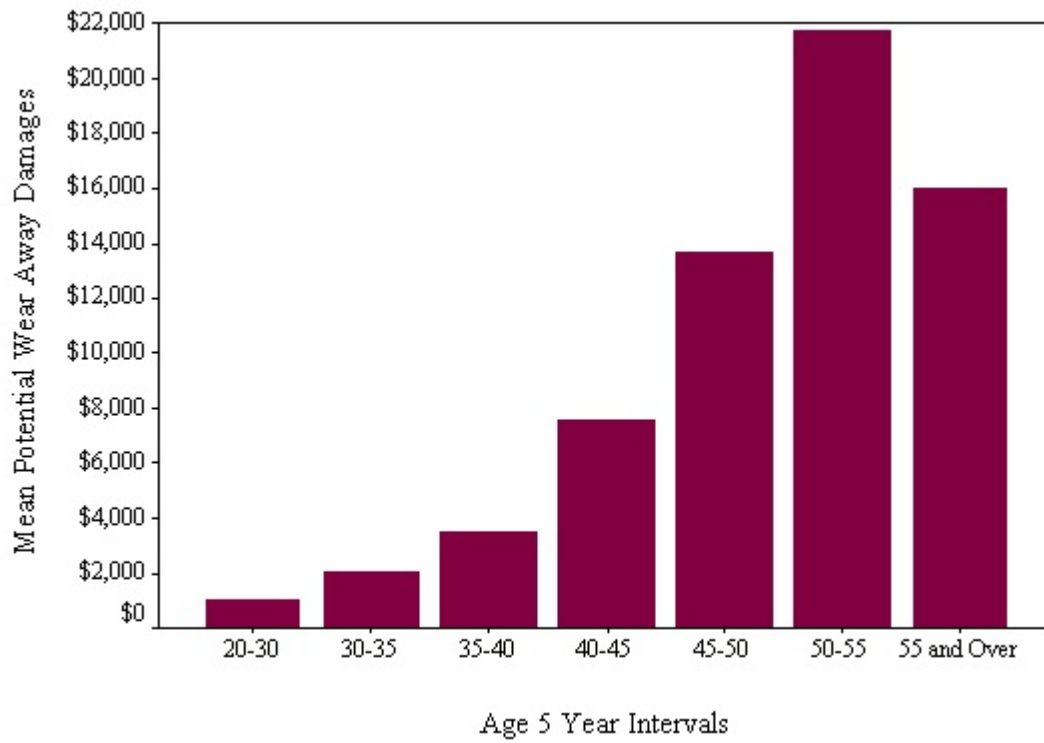
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<sup>11</sup>Damages are included only for employees for whom data were available.  
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**Chart 3: Potential Damages from Cash Balance Transition Greater for Older Employees**

The employees who did not elect to retain the prior plan through the grandfather option are included in Chart 3. These employees would suffer much greater potential damages due to wear away than other employees: \$20,105 on average, or almost three half again the damages of other employees. This supports a finding that the notice given to employees offered the grandfather option did not adequately explain the losses they would incur under the cash balance plan.

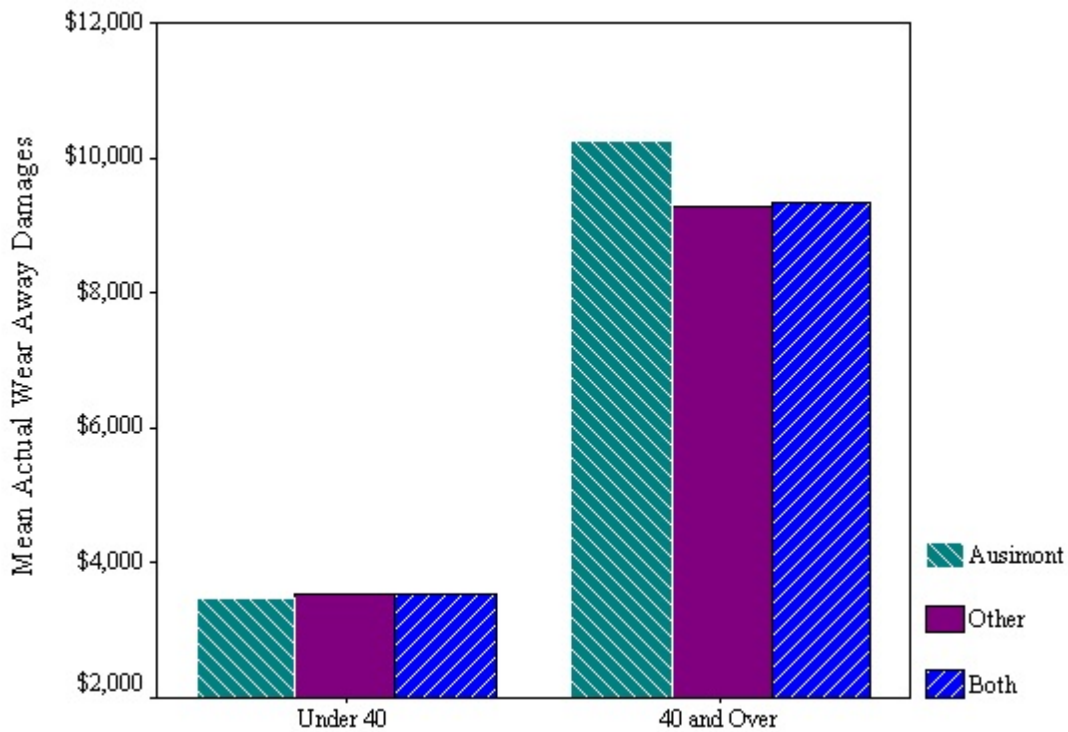
Chart 4 reports average potential damages by five-year age groups. This chart demonstrates that damages increase monotonically by age except for the employees over the age of 55 who are nearing retirement. Chart 4 shows a wide range of potential damages, from \$1,811 for employees under 30 to 20 times as much for those 50 to 55: \$21,752.

**Chart 4: Potential Damages by Five-Year Age Intervals**

### **Actual Damages from Wear Away Greater for Older Employees**

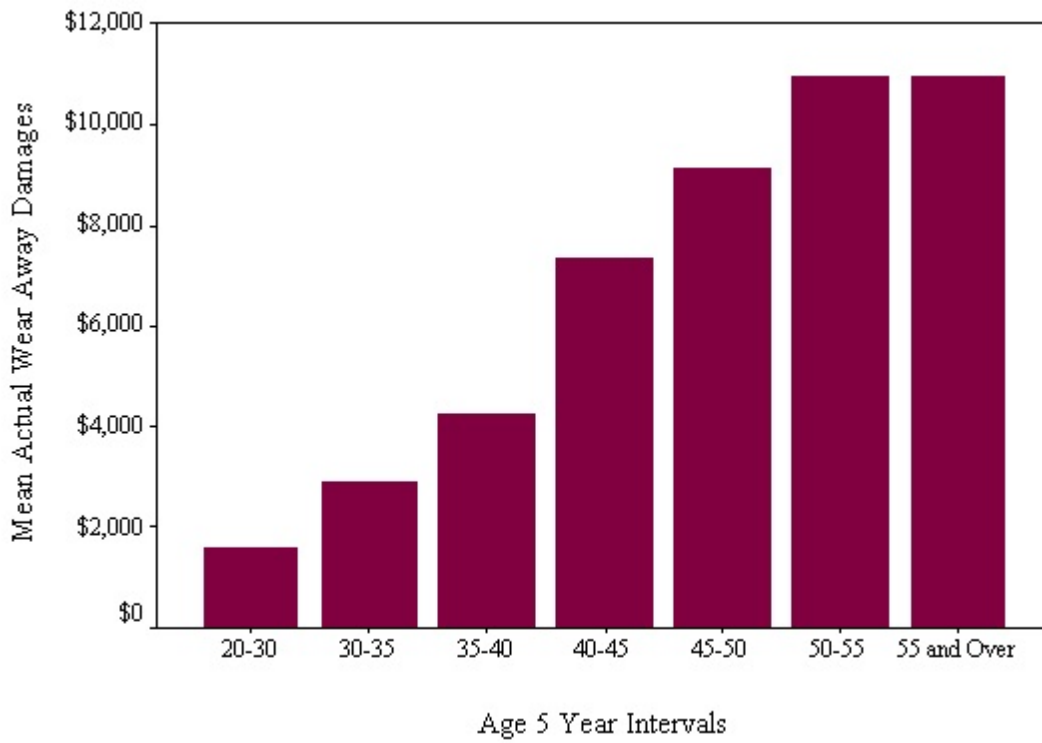
As with actual wear-away, actual damages reflect the losses that an employee at Solvay experienced due to wear-away during their tenure at Solvay to date. Damage calculations are based on the age 55 and over benefit. The losses are quite steep on average for all employees. My analysis also demonstrates that older employees suffered substantially greater losses. Employees lost benefits due to the plan transition from wear-away periods during which they earned no benefits. Chart 5 depicts the average actual damages by age group. This chart demonstrates that employees 40 and over experienced 2.6 times the loss of younger employees. Again, the pattern is similar for Ausimont employees, non-Ausimont and employees, and all employees together.

**Chart 5: Actual Damages Higher for Older Employees**



The average loss in actual benefits by five-year age group is shown in Chart 6. The losses are quite steep on average for all employees. However, Chart 6 shows that the losses were more severe for older employees, increasing for each five-year age group except for a slight decline for employees over 50. This chart shows that older employees' damages were as high on average as \$10,998, 6.7 times the \$1,653 average damages for the youngest employees.

**Chart 6: Actual Damages from Wear Aways by 5-Year Age Intervals**



**Losses of Future Retirement Benefits from Wear Aways Greater for Older Employees**

The average loss in retirement benefits from wear away to date by age group is shown in Table 1. The losses are substantial for all but the youngest employees. Employees who were between 50 and 55 have on average nearly a \$22,000 loss in potential future benefits and a \$11,000 loss in actual damage. The youngest employees on average have the least amount of damages.



| <b>Table 1: Average Loss in Retirement Benefits By Age on Transition Date</b> |  |                                       |
|---|--|---------------------------------------|
| <b>Age Interval</b>   | <b>Potential Loss in Future Benefits</b> | <b>Actual Loss in Future Benefits</b> |
| <b>20-30</b>  | \$1,081                                  | \$1,653                               |
| <b>30-35</b>  | \$2,100                                  | \$2,932                               |
| <b>35-40</b>  | \$3,634                                  | \$4,280                               |
| <b>40-45</b>  | \$7,646                                  | \$7,368                               |
| <b>45-50</b>  | \$13,733                                 | \$9,164                               |
| <b>50-55</b>  | \$21,752                                 | \$10,998                              |
| <b>55 and Over</b>  | \$16,068                                 | \$10,927                              |
| <b>Total</b>  | \$10,013                                 | \$7,259                               |

### **Older Employees Suffered Up To 90% of Wear Away Losses**

Totaling the damages for each employee with adequate data provides a calculation of the total damages due to wear away to date from the transition of the Solvay pension plan. The estimated damages are shown in Table 2. This table shows that 90 percent of the potential damages and 83 percent of the actual damages were borne by older employees.

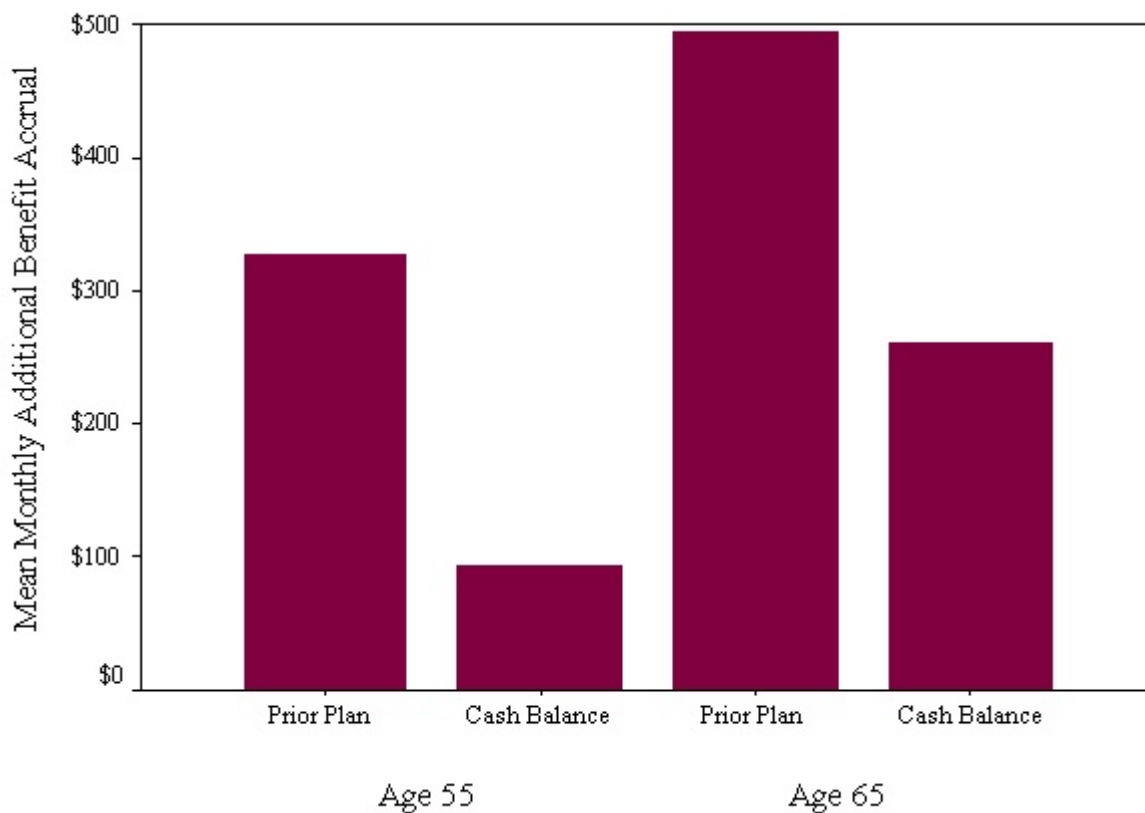
| <b>Table 2: Total Losses from Wear Away By Age</b> |  |                |                                       |                |
|--|--|----------------|---------------------------------------|----------------|
| <b>Age Group</b>                                   | <b>Potential Loss in Future Benefits</b> |                | <b>Actual Loss in Future Benefits</b> |                |
|  | <b>Damages</b>                           | <b>Percent</b> | <b>Damages</b>                        | <b>Percent</b> |
| <b>Under 40</b>                                    | \$3,357,841                              | 10.1%          | \$4,040,735                           | 17.3%          |
| <b>40 and Over</b>                                 | \$29,886,455                             | 89.9%          | \$19,259,298                          | 82.7%          |
| <b>Total</b>                                       | \$33,244,296                             | 100.0%         | \$23,300,033                          | 100.0%         |

### 5. Plan Transition Significantly Reduced Future Benefit Accruals

In addition to the spreadsheets used to calculate wear-away and damages due to wear away, Mr. Poulin developed spreadsheets to calculate the reduction in benefits resulting from the plan transition. As employees continue to work after the date of transition to the cash balance plan, they accrue benefits more slowly than under the prior pension plan. For most employees, there is a period during which they do not accrue benefits at all, due to the wear-away effects discussed previously. When that period ends, the employees may begin to accrue benefits again, but at a much slower rate than they would have under the previous plan. The benefit reduction analysis presented here compares the monthly benefit accrued under the cash balance plan to the monthly benefit that would have been accrued under the prior pension plan. This comparison is shown at five, ten, and fifteen years after the transition date.

Chart 7 shows benefit reductions after five years for benefits commencing at age 55 and age 65. Benefit reductions on average are substantial in both cases. The average age 55 prior plan monthly benefit accrual of \$328 is reduced 71 percent to \$96.<sup>12</sup> The average age 65 benefit accrual is cut from \$495 per month to \$263 per month.

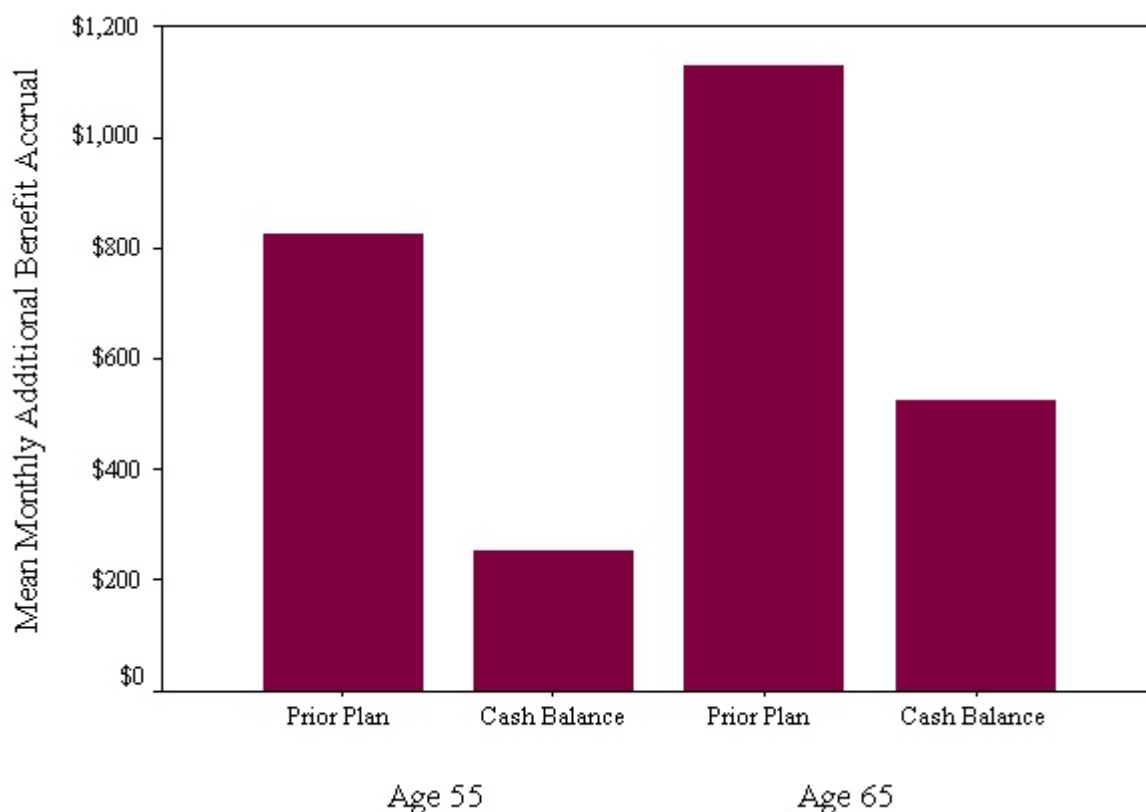
**Chart 7: Cash Balance Plan Sharply Reduces 2005 to 2010 Benefit Accruals**



<sup>12</sup>This analysis excludes Ausimont employees.

This pattern is exacerbated with additional years in the cash balance plan. Chart 8 shows the pattern after 10 years, in 2015. This chart shows that the average prior plan age 55 benefit accrual of \$827 per month has been reduced to under one-third, \$258. The average age 65 benefit accrual is cut from \$1,133 to \$523.

**Chart 8: Cash Balance Plan Sharply Reduces 2005 to 2015 Benefit Accrual Rates**



### **Benefit Reductions Disproportionately Impact Older Employees**

On average all employees suffer a severe reduction in benefit accruals as a result of the plan transition because of the wear-away design and the poorer benefit formula. However, older employees are impacted disproportionately. The age disparity in benefit reductions is so extreme that the higher accrual rates normally enjoyed by older employees are reduced to the point that they are *less than the reduced accrual rates for younger employees*.

This pattern is depicted in Chart 9 for age 55 benefits. This chart shows that under the prior plan formula older employees have a \$385 monthly benefit accrual after 5 years, which is 168 percent of the accrual rate of younger employees under the prior plan. However, under the cash balance plan, monthly benefit accruals for older employees are reduced to less than one-seventh their prior plan amount, to \$86. Younger employees experience a reduction of one half from \$230 under the prior plan to \$113 under the cash balance plan. Since the reduction for older employees is so much larger, the benefit accrual for younger employees is *larger under the cash balance plan than for older employees*, reversing the normal pattern.

**Chart 9: Age Disparity in Age 55 Benefit Accruals from 2005 to 2010**

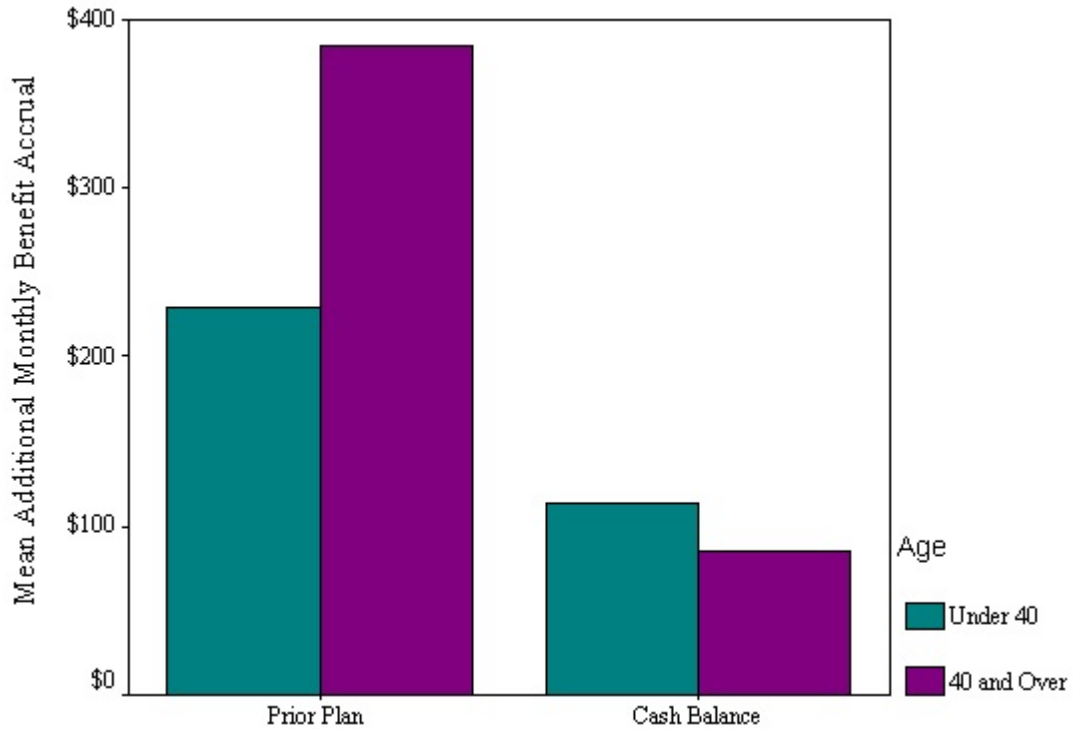


Chart 10 reveals that the same pattern holds for age 65 benefits: the higher accrual rate for older employees is reduced disproportionately so that younger employees have higher average accrual rates under the cash balance plan. This pattern is repeated in 2015 and 2020, 10 and 15 years after the plan transition.

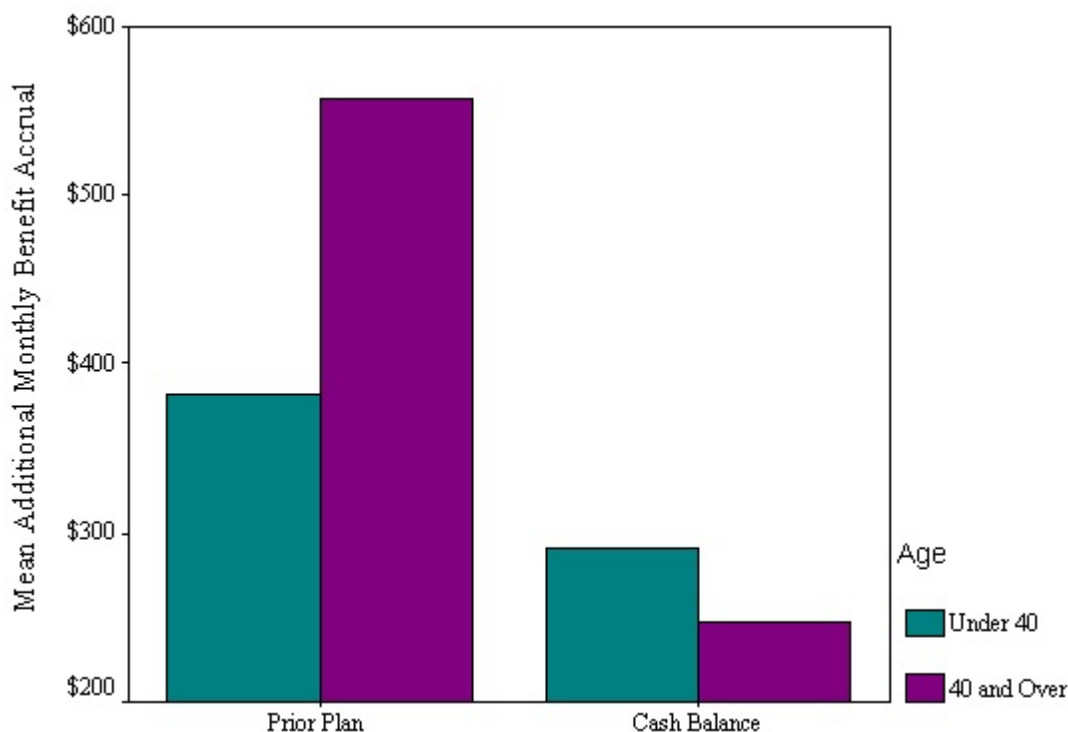
**Chart 10: Age Disparity in Age 65 Benefit Accruals from 2005 to 2010**

Table 3 lists the benefit accrual rates for age 55 and age 65 benefits, 5, 10 and 15 years after the plan transition by age. The average percentage reduction in benefits for all employees by age group is also shown in Table 3. The reductions are quite steep on average for all employee, cutting about seven-tenths of the benefit accruals under the prior plan. The table also shows the reduction for employees 40 and over versus younger employees. These monthly accruals reveal that the plan transition cut older employees' benefit accruals much more than those for younger employees. The adverse impact ratio, calculating the percentage reduction for older employees compared to younger employees reveals that older employees suffered up to one and one-half times the reduction for younger employees.

| <b>Table 3: Reduction in Age 55 Benefit Accruals By Age</b> |                                     |                          |               |                                      |                          |               |
|---|-------------------------------------|--------------------------|---------------|--------------------------------------|--------------------------|---------------|
| <b>Employee Group</b>                                       | <b>Benefits After 5 Years: 2010</b> |                          |               | <b>Benefits After 10 Years: 2015</b> |                          |               |
|   | <b>Prior Plan</b>                   | <b>Cash Balance Plan</b> | <b>% Loss</b> | <b>Prior Plan</b>                    | <b>Cash Balance Plan</b> | <b>% Loss</b> |
| <b>All Employees</b>  | \$328                               | \$96                     | -71%          | \$827                                | \$258                    | -69%          |
| <b>Under 40</b>   | \$230                               | \$113                    | -51%          | \$529                                | \$262                    | -50%          |

| <b>Table 3: Reduction in Age 55 Benefit Accruals By Age</b> |                                     |                          |               |                                      |                          |               |
|---|-------------------------------------|--------------------------|---------------|--------------------------------------|--------------------------|---------------|
| <b>Employee Group</b>                                       | <b>Benefits After 5 Years: 2010</b> |                          |               | <b>Benefits After 10 Years: 2015</b> |                          |               |
|   | <b>Prior Plan</b>                   | <b>Cash Balance Plan</b> | <b>% Loss</b> | <b>Prior Plan</b>                    | <b>Cash Balance Plan</b> | <b>% Loss</b> |
| <b>40 and Over</b>  | \$385                               | \$86                     | -78%          | \$827                                | \$258                    | -69%          |
|   | <b>Adverse Impact Ratio =</b>       |                          | 153%          | <b>Adverse Impact Ratio =</b>        |                          | 137%          |

Similar reductions in age 55 benefits are found in 2020, 15 years after the plan transition. The pattern is repeated for age 65 benefits as shown in Table 2. The reduction in age 65 benefits are smaller in percentage terms but usually larger in dollars amounts. In addition, the disparate impact on older employees is even more severe, being 234 to 193 percent of the impact on younger employees at 5 and 10 years, respectively.

| <b>Table 4: Reduction in Age 65 Benefit Accruals By Age</b> |                                     |                          |               |                                      |                          |               |
|---|-------------------------------------|--------------------------|---------------|--------------------------------------|--------------------------|---------------|
| <b>Employee Group</b>                                       | <b>Benefits After 5 Years: 2010</b> |                          |               | <b>Benefits After 10 Years: 2015</b> |                          |               |
|   | <b>Prior Plan</b>                   | <b>Cash Balance Plan</b> | <b>% Loss</b> | <b>Prior Plan</b>                    | <b>Cash Balance Plan</b> | <b>% Loss</b> |
| <b>All Employees</b>  | \$495                               | \$263                    | -47%          | \$1,133                              | \$523                    | -54%          |
| <b>Under 40</b>   | \$383                               | \$291                    | -24%          | \$881                                | \$598                    | -32%          |
| <b>40 and Over</b>  | \$558                               | \$247                    | -56%          | \$1,274                              | \$482                    | -62%          |
|   | <b>Adverse Impact Ratio =</b>       |                          | 234%          | <b>Adverse Impact Ratio =</b>        |                          | 193%          |

## 6. Conclusion

This report provides incontrovertible evidence that older employees were adversely impacted by the pension plan transition engineered by Solvay. This report is based on the data produced to date. This report may be amended or a supplemental report submitted as a result of subsequent production by defendants. Section 1 lists detailed conclusions under the Summary of Findings.

## 7. Data and Information Sources Used

This is an analysis based on documents received to date. This report may be revised and a supplemental report submitted if additional information is provided. I have used the following information in this analysis:

### Data and Documentation

1. Excel spreadsheets and Access file of data provided by Solvay for 3,680 plan participants.
2. Declaration of Claude Poulin with exhibits A through J, including spreadsheets for exhibits D through G.
3. Class and Collective Action Complaint, filed on Nov. 13, 2006.
4. Solvay America Companies Pension Plan, as Amended and Restated Effective January 1, 2001, with First to Eighth Amendments.
5. 2003 and 2005 Solvay America Companies Pension Plan Summary Plan Description.
6. Form 5500 Annual Return/Report for the Solvay America Companies Pension Plan for 2005 and 2006.

### Books

7. Norusis, Marija J., *SPSS for Windows: Base System, Release 6.0*. SPSS, 1993.

## 8. Consultant Background

I have been retained as an expert witness in this case. I possess a Ph.D. in Mathematical Statistics and have been endorsed as an expert in the field of statistics. I have been retained by plaintiffs and defendants to perform statistical evaluation of discrimination in a variety of contexts, and have testified as an expert in the area of statistics and the statistical evaluation of discrimination in United States District Court for the District of Colorado, United States District Court, Nevada, and the Circuit Court of the Sixth Judicial Circuit, Pinellas County, Florida. My Curriculum Vitae is attached. Cases in which I have testified as an expert at trial or by deposition within the preceding four years are indicated on my Curriculum Vitae in bold and are bulleted (▣). My publications in the previous ten years are listed in my Curriculum Vitae.

My hourly rates are \$350 per hour for testimony and preparation, \$250 for consultation and research.

Robert A. Bardwell, Ph. D.

A handwritten signature in black ink, appearing to read 'Robert A. Bardwell', written in a cursive style.



**Attachment 1: Electronic Files Including Data Compiled and Processed by Plaintiffs**

Provided separately in electronic form.

## Attachment 2: Curriculum Vitae of Robert A. Bardwell, Ph. D.

**PERSONAL:**

ROBERT A. BARDWELL  
 4801 W. Yale Ave.  
 Denver, Colorado 80219  
 (303) 934-3851

**EDUCATION:**

|                                 |       |             |             |
|---------------------------------|-------|-------------|-------------|
| University of Colorado, Boulder | Ph.D. | Mathematics | 1985 – 1989 |
| University of Colorado, Denver  | B.A.  | Philosophy  | 1981 – 1982 |
| University of Chicago           |       |             | 1969 – 1971 |

**PROFESSIONAL EXPERIENCE:**

|  |                |
|--|----------------|
| Statistical consulting                                   | 1989 – present |
| University of Colorado instructor and teaching assistant | 1985 – 1989    |
| Research, consulting and statistical programming         | 1976 – 1986    |

**PUBLICATIONS:**

- Bardwell, Robert A., Paul Klite, and Jason Salzman. “Local TV News: Getting Away with Murder.” *Harvard International Journal of Press/Politics*, 2(2): 102-112 (1997).
- Max, Wendy, Dorothy P. Rice, Eric Finkelstein, Robert A. Bardwell, Steven Leadbetter. “The Economic Toll of Intimate Partner Violence against Women in the United States.” *Violence and Victims*, 19 (3) (June 2004).

**RESEARCH, CONSULTING, AND STATISTICAL PROGRAMMING:**

- Stephen R. Bruce, Washington, D.C., 2009 -  
 Retained as expert witness for plaintiffs claiming violation of the ADEA and ERISA by replacing a defined benefit retirement plan with a cash balance plan in a manner that freezes the benefits of older, longer-service employees during a “wear-away” period, in re Wade. E. Jensen and Donald D. Goff, individually and on behalf of all others similarly situated, v. Solvay Chemicals, Inc., Solvay America, Inc., Solvay America Companies Pension Plan, Civil Action No. 06-CV-273 (ABJ/WCB), United States District Court, District of Wyoming.
- ▣ Stephen R. Bruce, Washington, D.C., 2008 -  
 Retained and **Deposed** as expert witness for plaintiffs claiming violation of the ADEA and ERISA by replacing a defined benefit retirement plan with a cash balance plan in a manner that freezes the benefits of older, longer-service employees during a “wear-away” period, in re Phillip C. Engers, Warren J. McFall, Donald G. Noerr, and Gerald Smit, individually and on behalf of all others similarly situated, v. AT&T Corporation and AT&T Management Pension Plan, Civil Action No. 98-CV-3660 (SRC/CCC), United States District Court, District of New Jersey (Newark).
- Hoskin, Farina & Kampf, P.C., Grand Junction, Colorado, 2008  
 Retained as expert witness for defendants to rebut claim of age discrimination in hiring and compensation of teachers in the Mesa County Valley School District from 2001 to 2008 in Re: Phillips v. Mesa County Valley School District No. 51, Case No.: 2007cv505, Mesa County Court, Colorado.
- ▣ Stephen R. Bruce, Washington, D.C., 2008 -  
 Retained and **Deposed** as expert witness for plaintiffs claiming violation of the ADEA and ERISA by replacing a defined benefit retirement plan with a cash balance plan in a manner that freezes the benefits of older, longer-service employees during a “wear-away” period, in re Phillip C. Engers, Warren J. McFall, Donald G. Noerr, and Gerald Smit, individually and on behalf of all others similarly situated, v. AT&T Corporation and AT&T Management Pension Plan, Civil Action No. 98-CV-3660 (SRC/CCC), United States District Court, District of New Jersey (Newark).
- Governor’s Energy Office, Colorado, 2008

Received grant to build a commercial version of the OptiMiser software developed by Bardwell Consulting. OptiMiser provides economic and engineering analysis of building retrofit packages, integrating efficiency measures and renewable energy technologies. Financial tools include present value analysis of benefit-cost ratios, internal rate of return, and years to positive cash flow. OptiMiser creates and evaluates a full range of near-optimal solutions for energy retrofits, offering a flexible and efficient tool for the energy analyst, minimizing required data entry and fully integrating renewable energy technologies.

- Glustrom and LaPlaca, Denver, Colorado, 2008
  - Submitted testimony on existing utility incentives and the regulatory structure before the Public Utilities Commission of the State of Colorado, Docket No. 08I-113EG.
- ▣ Joseph M. Sellers, Cohen, Milstein, Hausfeld & Toll P.L.L.P., New York, 2008 -
  - Retained and **deposed** for plaintiffs regarding the impact of underwriting on black applicants in re Patricia Amos, et al. v. GEICO Corporation, et al., Civil Action No. 06-cv-1281 (RHK/JSM), United States District Court, District of Minnesota.
- Glustrom and LaPlaca, Denver, Colorado, 2007-8
  - Created econometric models of electrical generating resources demonstrating the impact on levelized costs of modeling assumptions. Submitted written testimony and **testified** in PUC hearings re: (1) models showing improper resource selection resulting from use of high discount rates in present value modeling; (2) a statistical decomposition of error in Energy Information Administration forecasts of natural gas showing high levels of bias; (3) an alternative forecast of natural gas prices based on petroleum costs and demand and production forecasts; and (4) Monte Carlo modeling of levelized costs demonstrating the risk associated with resources from escalating fuel, CO<sub>2</sub> and water costs, poorly monetized costs of other emissions, and escalation of capital costs for IGCC and nuclear resources. Submitted Answer testimony, Cross-Answer testimony, oral testimony, and material for a Statement of Position in Hearings before the Public Utilities Commission of the State of Colorado in the application by the Public Service Company of Colorado for Approval of its 2007 Colorado Resource Plan, Docket No. 07A-447E.
- Nichols Kaster & Anderson, PLLP, Minneapolis, Minnesota, 2007-8
  - Retained to identify potential Muslim class members using custom Muslim name identification program.
- ▣ Stephen R. Bruce, Washington, D.C., 2007 -
  - Retained and **Deposed** as expert witness for plaintiffs claiming violation of the ADEA and ERISA by replacing a defined benefit retirement plan with a cash balance plan in a manner that freezes the benefits of older, longer-service employees during a “wear-away” period, in re Wayne Tomlinson, et al. v. El Paso Corporation and El Paso Pension Plan, Civil Action No. 4-cv-02686-WDM-CBS, United States District Court, for the District of Colorado.
- Minami Tamaki LLP, San Francisco, California, 2007-8
  - Retained as expert witness for plaintiffs in race discrimination in hiring class action, in re Albert Crews et al. v. Cisco Systems, United States District Court, Northern District of California.
- Hagens Berman Sobol Shapiro Llpredo LLP, Los Angeles, 2007-
  - Retained as expert witness by plaintiffs in California overtime employment class action, to testify regarding the appropriate use of sampling to estimate damages and provide evidence of commonality in re Randall et al. v. Costco Wholesale Corporation, Case No.: BC 296369, California Superior Court.
- REKO LLP, Toronto, Ontario, 2007-
  - Retained as expert witness by plaintiffs in nationwide overtime employment class action, to design a stratified random sample to estimate damages and provide evidence of commonality in re Fresco v. Canadian Imperial Bank of Commerce, File No. 07-W-334113PC2, Ontario Superior Court, Canada.
- Institute for Environmental Solutions, Denver, 2007 -

Retained as sampling and research design consultant on *The Tree Project*, a community-scale research program to assess the environmental impact of urban tree cover. Assisted with the integration of available scientific tools, and the development of new measurement protocols, and consulted on the design of the spacial sampling plan for the initial survey in Golden, Colorado.

- FIMAC Solutions, Inc., Denver, 2007 -  
Retained to research and develop econometric analysis of core deposits for banking institutions. Developed a suite of analytic tools that, (1) provide less conservative projections of the decay rate of non-maturity deposits than those provided by regulatory agencies; (2) generate more accurate forecasts of account balances; and (3) include an index to evaluate risk form core deposit decline. These analytic tools employ appropriate times series and hazard rate analyses.
- Arius Energy, LLC, Denver, 2006 -  
Designed and developed web-based tool for individuals and communities to track their carbon footprint and energy consumption.
- Federal Election Commission, 2006-7  
Designed and developed sampling program used by the Federal Election Commission to monitor contributions and expenditures for all Federal elections. Program was developed as a web-based application that can also run on auditors' notebook computers. Program designs, draws and evaluates samples of transactions for audit. All results were tested against the American Institute of Certified Public Accountant statistical auditing programs.
- John Robert Holland, Denver, Colorado, 2007  
Retained as expert witness by plaintiffs to evaluate the adverse impact of treatments for bed bug infestations on persons with disabilities in re Charlotte McConnell, Willard McConnell and John McConnell v. The Tower at Speer, LLC, Marcy Payne, and Libby Burney, District Court, City and County of Denver, Colorado.
- Nichols Kaster & Anderson, PLLP, Minneapolis, Minnesota, 2006-7  
Retained as expert witness by plaintiffs to evaluate the adverse impact of hiring, compensation, discipline and terminations decisions on Hispanic employees in re Mendez et all v. Faribault Foods, Inc. and The Work Connection, United States District Court, Minnesota.
- Cornish and Dell'Olio, Colorado Springs, Colorado, 2006-  
Retained as expert witness by plaintiff to evaluate the disparate impact of testing and terminations decisions on the women in the training academy for the Colorado Springs Fire Department, in re Karyn S. Palgut v. The City of Colorado Springs, Civil Action No. 06-cv-01142-WDM-MJW, United States District Court, Colorado.
- Legal Aid Society of Minneapolis, Minneapolis, Minnesota, 2006  
Retained as expert witness by plaintiffs to evaluate the adverse impact of alternative pre-employment tests on Minneapolis Fire Cadet Selection Process; demonstrated adverse impact and proposed the remedy which was implemented, of augmenting pool of Stage II candidates with 55% additional protected class applicants.
- Killmer, Lane & Newman, LLP, Denver, Colorado, 2006-  
Retained as expert witness by plaintiffs to evaluate the impact of gender on utilization, hiring and promotions at Car Toys, Inc., in re Monica Britton, et al. v. Car Toys, Inc., and Bruce Cameron, Civil Action No. 05-CV-00726-WYD-PAC, United States District Court, Colorado.
- ▣ Shores, Williamson & Ohaebosim, LLC, Wichita, Kansas, 2006  
**Deposed** as expert witness by plaintiffs to evaluate the impact of gender on workforce utilization, promotions, terminations, and compensation at The Fresh Market, Inc., in re Terrence Mcfadgon, Terra Mukes, Gloria Keith, and Starika Smith v. The Fresh Market, Inc., Case No.: 05-2151, United States District Court, Western District of Tennessee.
- University of Colorado Health Sciences Center, Denver, Colorado, 2005-

Member of research team for *A Study of Immigrant Housing Conditions in Commerce City, Colorado*, to assess housing-related health risks affecting recent immigrant families with children. Responsible for construction of housing inventory and GIS profile of the study area; construction of the sample frame; design the sample of participating households; supervision of survey analysis, compilation of survey estimates, and contribution to resulting publications.

- ▣ McKenna Long & Aldridge LLP, Denver; Seyfarth Shaw LLP, Washington, D.C., 2005-  
**Deposed** as expert witness for defendants on the impact of age on separations at the Hershey Company, in re Montagne, et al. v. The Hershey Company, Case No.: 04-cv-1881-WYD-BNB, United States District Court, Colorado.  
 The Carey Law Firm, Colorado Springs, Colorado, 2005-  
 Retained, **deposed** and **testified** as expert witness by plaintiffs to estimate attorneys fees retained by the Colorado in Supplemental Security Income (SSI) Reimbursements, 1997 - 2005, in re Chad Martinez and Larry King v. Colorado Department of Human Services and Otero County Department of Human Services, Case No.: 02 CV 1066, District Court, City and County of Denver, Colorado.
- Cayman Islands Real Estate Brokers Association, Grand Cayman, Cayman Islands, 2005-2006  
 Retained to conduct an econometric analysis of the impact of stamp duty rates on real estate transaction volume and value in the Cayman Islands from 1990 through 2004.
- Shores, Williamson & Ohaebosim, LLC, Wichita, Kansas, 2005-  
 Retained as expert witness by plaintiffs to evaluate the impact of gender on workforce utilization, promotions, terminations, and compensation at Wichita Police Department in re Greta Semsroth, et al. v. City of Wichita, and Chief Norman Williams, Case No. 04-1245-MLB, United States District Court, District of Kansas.
- ▣ King & Greisen, LLP, Denver, Colorado, 2005-  
**Deposed** as expert witness by plaintiffs to evaluate race discrimination in layoffs in re Freeman, et al. V. Roxanne White, et al., Case No.: 05CV164, United States District Court, Colorado.
- Burr & Smith, LLP, Tampa, Florida, 2005-6  
 Retained as expert witness by plaintiffs to design a stratified random sample of nationwide class to estimate damages and provide evidence of commonality in re Kent Dunwiddie, Grant Lincoln, and Edward Gotowala, et al. v. Central Locating Service, Ltd., Corporation, Case No.: 5:04CV315-OC-10GRJ, United States District Court, Middle District of Florida.
- Bennett Bigelow & Leedom, P.S., Seattle, Washington, 2005  
 Retained regarding health care regulatory dispute, to evaluate the application of non-linear regression model in calculating demand for kidney dialysis facilities.
- ▣ Strindberg Scholnick & Chamness, LLC, Salt Lake City, Utah, 2005  
**Deposed** as expert witness for plaintiffs regarding race discrimination in workforce utilization, concentration and underrepresentation, in re Terry H. Fullwiley v. Union Pacific Corporation and Union Pacific Railroad Company, Case No. 2:04-CV-671DB, United States District Court, District of Utah, Central Division.
- White O'Connor Curry & Avanzado LLP, Los Angeles, California, 2005  
 Retained as expert witness for defendants to evaluate alleged age discrimination in terminations in re Harold Moore Hennessy, et al. v. Infinity Radio Inc., Arbitration No. 77116Y0035804 BEAH, American Arbitration Association, Denver, Colorado.  
 Colorado Center on Law and Policy, Denver, 2004  
**Testified** as expert on computer systems and statistical modeling for plaintiffs, assessing adequacy of project management, testing, and preparation for release of the Colorado Benefits Management System (CBMS), which was designed to integrate administration of six Colorado and Federal benefit programs for all Colorado counties. Developed and presented model of caseload backlog resulting from CBMS implementation in re Valerie Imani Hawthorne-Bey, et. al., v. Karen Reinerstson, Executive Director of the Colorado

Department of Health Care Policies and Financing, et. al., Case No. 04-CV-7059, District Court, City and County of Denver, Colorado.

- Newman & Newman, LLP, Seattle, Washington, 2004 –  
Retained as expert witness for plaintiffs to design a sample of all Internet domain name registration changes over a two year period and to create an econometric model of the impact of the Internet domain name Wait Listing Service to be implemented by defendants in re Registersite.com et al. V. Internet Corporation for Assigned Names and Numbers, Verisign, Inc., and Does 1-10, Case File No. CV04-1368 ABC (CWx) 02-RB-2104 (CBS), United States District Court, Central District of California.
- King Clextion & Feola, Denver, Colorado, 2004 – 2005  
Retained as expert witness for plaintiff to analyze the impact of race and national origin on promotions and compensation in re Medhanie Gebreluel Werede v. Allright Holdings Inc., Civil Action No. 01-WM-1167, United States District Court, Colorado.
- Hale Hackstaff Friesen, LLP, Denver, Colorado, 2004 – 2005  
Retained as expert witness for plaintiff to design and conduct a door-to-door survey of voters and voting behavior to determine the impact of disparate treatment of absentee ballots and to analyze evidence of voting rights violations in re Jeffrey Vigil v. Carol Snyder, County Clerk, Adams County Colorado, Case File No. 02-RB-2104 (CBS), United States District Court, Colorado.
- ▣ Nichols Kaster and Anderson, Minneapolis, Minnesota, 2003 – 2004  
**Deposed** as expert witness for plaintiff regarding race discrimination in utilization, and terminations in re Jarvis Jones v. St. Paul Companies, Inc., Case File No. 02-1305, United States District Court, Minnesota.
- ▣ Nichols Kaster and Anderson, Minneapolis, Minnesota, 2003 – 2004  
**Deposed** as expert witness for plaintiff regarding gender discrimination in utilization and salary and other compensation in re Susan M. Veeder v. Cargill, Incorporated, Civil No. 02-1711 (PAM/RLE), United States District Court, Minnesota.
- Killmer and Lane LLP, Denver, Colorado, 2003 – 2004  
**Testified** for defendant regarding expert report analyzing race, ethnic, and age composition of the Juror Pools and bias in jury selection process in re People of the State of Colorado v. Dante Lamar Owens, Case No. 98-CR-2729, District Court, Arapahoe County, Colorado.
- DeFranco & Allen, LLC, Boulder, Colorado, 2003 – 2004  
**Testified** for defendant as expert witness regarding race, ethnic, and age composition of the Juror Pools in Arapahoe County, Colorado. Constructed model of jury selection process revealing systemic bias in re People of the State of Colorado v. Trevon Washington, Case No. 98-CR-2459, District Court, Arapahoe County, Colorado.
- Thomas Feldman, Denver, Colorado, 2002 – 2004  
**Testified** as expert witness for plaintiff to evaluate discrimination in layoffs related to filing worker's compensation claims in re Denise J. Welsch v. Sundyne Corporation, Civil Action No. 02-Z-468 (BNB), United States District Court, Colorado.
- ▣ Nichols Kaster and Anderson, Minneapolis, Minnesota, 1998 – 2003  
**Deposed** as expert witness for plaintiff to evaluate race and ethnic discrimination in hiring, utilization, promotions, and salary in re Maria Garcia, et al. V. Viratec Thin Films, Inc., Civil Number 01-1978 MJD/JGL, United States District Court, Minnesota.
- ▣ King Clextion & Feola, Denver, Colorado, 2002 – 2003  
**Deposed** as expert witness for plaintiffs to analyze the impact of race and national origin on promotions and compensation in re Solomon Goitom, Amune D. Meskele, Fowski Ali, and Omar Nur v. Allright Holdings, Inc., Civil Action No. 01-WM-1353 (CBS), United States District Court, Colorado.
- Johnson, Blakely, Pope, Bokor, Ruppel & Burns, P.A., Tampa, Florida, 2001 –  
**Testified** as expert witness for plaintiff to evaluate the impact of race on the quality of education and the relative impacts of poverty and race in re William Crowley v. The Pinellas

County School Board, et al., Case No.00-005667-CI-021, Circuit Court of Sixth Judicial Circuit, Pinellas County, Florida.

Tegtmeier, Frank & Jones, LLC, Colorado Springs, Colorado, 2001

**Testified** regarding expert report for defendant analyzing race, ethnic, and age composition of the Qualified Jury Panel and bias in jury selection process in re U.S.A. v. Rice, United States District Court, Colorado.

Gerash, Prugh & Gerash, L.L.C., Denver, Colorado, 2001

**Testified** regarding expert report for defendant analyzing race, ethnic, and age composition of the Qualified Jury Panel and bias in jury selection process in re U.S.A. v. Carl Kenneth Kabat, Case No. 00-CR-385-N, United States District Court, Colorado.

- Research Triangle Institute, Research Triangle Park, North Carolina, 2000 – 2001

Center for Disease Control, Washington, D.C.

Retained to lead project to analyze large and detailed national probability sample and compute statistical estimates and variances for incidence, prevalence, and total costs in *Cost Study of Intimate Partner Violence Against Women* being prepared for congress, and to conduct independent evaluation of the cost report.

- Register Machine Learning Technologies, Inc., Littleton, Colorado, 2000 – 2001

Retained to develop algorithms applying probability theory to improve performance of advanced genetic programming computer application.

Kummer Kaempfer Bonner & Renshaw, Las Vegas, Nevada, 2000 – 2004

**Deposed and testified** as expert witness for plaintiff on the impact of race in hiring and promotions in re Jordan v. County of Clark and Clark County Department of Aviation, Case No. CV-S-99-0688-HDM (RJ), United States District Court, Nevada.

- Gerash, Prugh & Gerash, LLC., Denver, Colorado, 1999 – 2001

Prepared expert report for defendant analyzing race, ethnic, and age composition of the Qualified Jury Panel and bias in jury selection process in re U.S.A. v. Lawrence Sposato et al., Case No. 99 CR 232-S, United States District Court, Colorado.

- U. S. Equal Employment Opportunity Commission, Denver District Office, Colorado, 1999 – 2001

Retained to analyze the existing model used to estimate labor market availability for a large number of store locations, and to design a corrected model; evaluated the impact of racial discrimination in hiring, and the estimated the resulting damages.

- ▣ Zarlengo & Kimmell, LLC, Denver, CO, 2000

**Deposed** as expert for plaintiff on the impact of race on compensation and promotions at PacifiCare between 1997 and 1998 in re Antoinette Ingram v. FHP Health Care/PacifiCare, Case No. 98 BP 2795, United States District Court, Colorado.

- ▣ Holland & Hart LLP, Denver, Colorado, 2000

**Deposed** as expert for defendant to evaluate alleged age discrimination in layoffs in re Hennesy, et al. v. Gates Rubber Company, Civil Action No. 99-M-1787, United States District Court, Colorado.

- Goldstein and Dodge, Denver, Colorado, 2000

Submitted report assessing the bias in Division Independent Medical Examinations performed for the Division of Workers Compensation.

- Isaacson, Rosenbaum, Woods & Levy, P.C., Denver, Colorado, 1999 – 2000

Retained as expert witness for plaintiff to evaluate ethnic and gender discrimination in hiring, promotions and terminations in re Nuvia Rodriguez v. Greyhound Lines, Inc., Civil Action No. 99-N-1596, United States District Court, Colorado.

- The Leventhal Law Firm, P. C., Denver, Colorado, 1999

Submitted affidavit for plaintiff testifying to the limitations of the studies relied upon by defendant experts who discounted the possibility that injury resulted from rear-end collision, in re Czeslawa Sosnowska v. Kimberlee Hrbek Smith, Case No. 97CV1400, Denver District Court, Colorado.

- Feiger & Collison, P.C., Denver, Colorado, 1999 –  
Retained as expert witness for plaintiff to evaluate gender discrimination in promotions and terminations in re Blasio, et al. v. United Parcel Service, Case No. 98-M-1709, United States District Court, Colorado.
- Pacey Economics, Boulder, Colorado, 1999  
Retained to design and analyze samples of properties to be appraised in south Globeville neighborhood to estimate total property value for settlement of damages from heavy metals pollution from smelter.
- Collect America, Ltd., Denver, Colorado, 1999  
Retained to design and analyze samples of collections to be audited for approval of IPO.
- Nichols Kaster and Anderson, Minneapolis, Minnesota, 1998 –  
Retained as expert witness for plaintiff to evaluate race and ethnic discrimination in promotions and salary in re Augustine C. Crawford et al. v. Ceridian Corporation, Computing Devices International and General Dynamics Information Systems, Civil Number 97-2634, United States District Court, Minnesota.
- Center for Policy Research, Denver, Colorado, 1998 – 2000  
Retained as consultant on survey execution, weighting, and estimation for a large and detailed national probability sample for the National Violence Against Women survey; conducted sensitivity analyses and theoretical explication of the impact of sample weighting and revised methodology report throughout review by the Center for Disease Control.  
Curtis L. Kennedy, Denver, Colorado, 1997 – 2000  
**Testified and deposed** as expert witness for plaintiffs concerning alleged age discrimination in re James R. Henry v. US WEST, Inc. et al., Civil Action No. 96-N-724. United States District Court, Colorado.
- Boulder Police Department, Boulder, Colorado, 1998 – 1999  
Retained to evaluate probability associated with physical and circumstantial evidence, resulting in an unprecedented technique for identification of shot-shell pellet evidence in Case No. P83-7907, homicide of Sidney Wells.
- ▣ Mohr, Hackett, Pederson, Blakely, Randolph & Haga, P.C., Phoenix, Arizona, 1997 – 1999  
**Deposed** as expert witness for plaintiffs concerning alleged age discrimination in re Jeney v. Quaker Oats, Civil Action No. CIV 96-0822-PHX-RCB. Retained as expert witness concerning age discrimination in re Gentile v. Quaker Oats, Coleman v. Quaker Oats, Tallariti v. Quaker Oats, and Russell v. Quaker Oats and Christenson v. Quaker Oats.
- Miller, Lane, Killmer & Greisen, LLP. Denver, Colorado, 1998  
Retained as expert witness for plaintiff to evaluate race and ethnic discrimination in employment decisions in re Visor et al, v. Sprint/ United Management Company, Case Number 96-K-1730, U.S. District Court, Colorado.
- Johnson, Blakely, Pope, Bokor, Ruppel & Burns, P.A., Tampa, Florida, 1997  
Retained as expert witness for plaintiff to evaluate gender discrimination in allocation of stock option plan in re Gosche v. West Publishing Company, Case No. 97-Z-1954, U.S. District Court, Colorado.
- Johnson, Blakely, Pope, Bokor, Ruppel & Burns, P.A., Tampa, Florida, 1997 –  
Retained as expert witness for plaintiff to evaluate gender discrimination in allocation of stock and constructed econometric model of resulting losses in re Patricia Winn Carter and Maxine M. Jones, et al. v. West Publishing Company, Case No. 97-2537-CIV-T-26A, U.S. District Court, Middle District of Florida.  
Colorado Lawyers Committee, Denver, Colorado, 1997  
**Testified** as expert witness for plaintiffs concerning residency in land title dispute in re Espinoza v. Taylor, Case No. 81-CV-5, Culebra County District Court.
- Jefferson County Department of Human Services, 1997  
Retained to review the implementation of the NAOMI computer system at the Jefferson County Department of Human Services in response to persistent failures in prior launch of



the system; the NAOMI system was used by most or all caseworkers in Jefferson County to do CWEST submissions only, but had been designed to integrate casework for multiple programs related to child welfare. Authored report analyzing failures in the prior launch of NAOMI, and submitted recommendations for disciplined implementation.

- Colorado Department of Human Services, 1997  
Retained to develop computer programs to analyze recidivism and issues relating to the quality of child welfare using data in CWEST, the Child Welfare information system for Colorado.
- Roman, Benezra, & Culver, Denver, Colorado, 1997  
Retained as expert witness for plaintiffs concerning gender and ethnic discrimination claim resulting from terminations in re Chacon v. Public Service Company of Colorado.
- ▣ Fox & Robertson, P.C., Denver, Colorado, 1997  
**Deposed** as expert witness for plaintiff to design and conduct a public survey to project number of persons who use wheelchairs that are denied access to retail stores in re CCDC et al. v. Campbell-Ritter Corp. et al., 96-WY-2490-AJ, CCDC et al. v. AnnTaylor Stores Corp. et al., 96-WY-2491-AJ, CCDC et al. v. Nine West Group, Inc. et al., 96-WY-2492-AJ, and CCDC et al. v. Hermanson Limited Partnership I, 96-WY-2493-AJ, United States District Court, Colorado.
- ▣ Holland & Hart, Denver, Colorado, 1997  
**Deposed** as expert witness for defendant concerning alleged age discrimination in re Ronald Kirkland v. Safeway Inc., 96-CV-0264-J, United States District Court, Colorado.
- Roman, Benezra, & Culver, Denver, Colorado, 1996 – 2000  
Retained as expert witness for plaintiffs concerning age discrimination claim resulting from layoffs in re Vaszlavik et al. v. Storage Technology Corporation.
- Peacock & Myers, Albuquerque, New Mexico, 1996  
Retained in trademark infringement litigation to construct an econometric model of variable costs associated with production in re Rogers, et al. v. Legin, et al.
- Holland & Hart, Cheyenne, Wyoming, 1996  
Retained as expert witness for defendant concerning computation of lost earnings and age discrimination claim resulting from reduction in force in re David Moffat v. Amoco Corporation, Civil Action No. 95-CV-242-D, United States District Court, Wyoming.
- Mineral Management Services, U. S. Department of Interior, Denver, Colorado, 1996  
Retained to develop sampling plan, statistical algorithms and software to audit target selection and estimate royalty underpayment for statistical billing, and to compute median weighted gas valuation index.
- U. S. Department of Justice, District of Colorado, 1996  
Retained as expert witness for defendant concerning claim of age and gender discrimination in promotions in re Edward F. Craig, Jr. v. Hazel R. O'Leary, Civil Action No. 93-K-1828, United States District Court, Colorado.
- Gerash, Robinson & Miranda, P. C., Denver, Colorado, 1995  
Prepared expert report analyzing ethnic, gender, and age composition of the Qualified Jury Panel and bias in jury selection process in re U.S.A. v. Hampton, 95-CR-253-M, United States District Court, Colorado.
- ▣ Holland & Hart, Cheyenne, Wyoming, 1995  
**Deposed** as expert witness for defendant concerning age and ethnic discrimination claim resulting from reduction in force in re Robert Nicol v. Amoco Corporation, Civil Action No. 95-CV-115-D, United States District Court, Wyoming.
- Plaintiff Employment Lawyers Association, Denver, Colorado, 1995  
Conducted seminar on *Using Statistics to Prove Disparate Impact*.
- Jeffery Menter, Greenwood Village, Colorado, 1995  
Computed present value of lost earnings in re Michael Marsh v. Delta Air Lines, Inc.
- ▣ Bart Rice, P.C., Englewood, Colorado, 1995

**Deposed** as expert for plaintiffs regarding age bias in severances in re Mary Fields et al. v. Information Handling Services Inc., Civil Action No. 95-B-516, United States District Court, Colorado.

- Mineral Management Services, U. S. Department of Interior, Denver, Colorado, 1995  
Programmed method for aggregating transactions and computing median weighted gas valuation index; designed weighted, multi-stage, proportional sampling strategy for validating index using ratio estimation.
- Colorado Department of Social Services, Implementation Assistance Committee, 1995  
Retained to evaluate sampling strategy and survey analysis for measuring compliance with settlement agreement in re L.P.M., et al. by their next friend David Littman v. Roy Romer and Karen Beye, Civil Action No. 94-M-1417, United States District Court, Colorado.
- Mineral Management Services, U. S. Department of Interior, Denver, Colorado, 1995  
Authored report on the application of statistical sampling to audit target selection and royalty billing; programmed automated routines for designing the required samples, randomly sampling royalty transactions, and computing estimated underpayment.
- Macon Cowles & Associates, Boulder, Colorado, 1995  
Retained to analyze employee records for evidence of ethnic bias in promotions at the Denver Mint in re Joe Sanchez v. Lloyd Bensten, Civil Action No. 94-Z-1400.
- Mineral Management Services, U. S. Department of Interior, New Orleans, Louisiana, 1995  
Presented findings regarding methods for measuring gas, oil, and mineral royalty payment compliance and billing royalty underpayments based on statistical sampling to State and Tribal Audit Committee Conference.
- Sears, Anderson & Swanson, Colorado Springs, Colorado, 1994  
Evaluated disparities in salaries using multivariate regression.
- Holland and Hart, Denver, Colorado, 1993  
Consulted regarding discriminatory impact of investigative stops in re Irvin v. Sungailia, et. al., Civil Action No. 93-M-1551.
- ▣ Paul A. Baca, Denver, Colorado, 1993 – 1994  
**Deposed** regarding disparate impact of promotional practices of Denver Police Department in re Humphries v. Belo, Civil Action No. 93-N-2731.
- Teamsters Local Union No. 435, Denver, Colorado, 1993 – 1994  
Analyzed discipline and termination policy and provided expert report for arbitration involving Supervalu Inc.
- Children's Legal Clinic, Denver, Colorado, 1993 – 1994  
Consulted on survey design of judges and guardians ad litem, and designed program for monitoring guardian ad litem representation of children in dependency and neglect hearings in the Denver Juvenile Court.
- Robinson, Waters, O'Dorisio and Rapson, Denver, Colorado, 1993 – 1994  
Retained as expert to analyze class-wide age discrimination in terminations at Martin Marietta Corporation Astronautics Group for consolidated cases in re Marvin Wilkerson, et. al. v. Martin Marietta Corporation, Civil Action No. 91-S-2078, United States District Court, Colorado.
- Donald P. MacDonald, Denver, Colorado, 1993 – 1994  
Consulted concerning alleged age discrimination in terminations in re Ken Fortner v. Halliburton Energy Services.
- Reginald H. Martin & Associates, Denver, Colorado, 1993 – 1994  
Retained to design statistical method for measuring gas, oil, and mineral royalty payment compliance for the Mineral Management Service of the United States Department of Interior, and to design and analyze methods for billing royalty underpayments based on statistical sampling.
- Serge L. Herscovici, Littleton, Colorado, 1993  
Consulted concerning alleged gender discrimination in re Elizabeth Ponder v. Metromedia.

- Rothgerber, Appel, Powers & Johnson, Denver, Colorado, 1993  
Retained as consultant on alleged age discrimination in terminations in re Backlund et. al. v. Gates Corporation.
- Pulmonary Consultants, Denver, Colorado, 1993  
Reviewed analyses of two studies of dust exposure and pulmonary function.  
Colorado Lawyers Committee, Voting Rights Task Force, Denver, Colorado, 1993 – 1994  
Conducted study of minority voting patterns in current and revised House District 60 using ecological regression and homogeneous case analysis; **deposed and testified** as expert witness in voting rights litigation in re Jennie Sanchez, et. al. v. Colorado, Civil Action No. 93-S-963, United States District Court, Colorado.
- Serge L. Herscovici, Littleton, Colorado, 1993  
Retained as expert to prepare analysis of age discrimination in departmental terminations in re Mildred M. Pittman, et. al. v. Martin Marietta Corporation, Civil Action No. 92-M-1557, United States District Court, Colorado.
- World Gaming Corporation, Las Vegas, Nevada 1992 – 1994  
Computed probabilities and payoffs for new casino game.
- ▣ Paul A. Baca, Denver, Colorado, 1992 – 1994  
**Deposed** as expert on ethnic discrimination in promotions in re Rodriquez, et. al. v. Denver Sheriff's Department, et. al., Civil Action No. 92- -2335, United States District Court, Colorado.
- Robinson, Waters, O'Dorisio and Rapson, Denver, Colorado, 1992 – 1993  
Retained as expert to prepare analysis of age discrimination in departmental terminations in re Marvin Wilkerson, et. al. v. Martin Marietta Corporation, Civil Action No. 91-B-2078, United States District Court, Colorado.
- Colorado Lawyers Committee, Foster Care Task Force, 1992 – 1994  
Retained as expert consultant to analyze Foster Care Review database and prepared issues analysis in re L.P.M., et. al. by their next friend David Littman v. Roy Romer and Karen Beye, Civil Action No. 94-M-1417, United States District Court, Colorado.
- Causey, Demgen & Moore Inc., Denver, Colorado, 1992  
Designed stratified sample of inventory for Tattered Cover Bookstore audit.
- ▣ Robinson, Waters, O'Dorisio and Rapson, Denver, Colorado, 1992  
**Deposed** as expert concerning analysis of age discrimination in departmental terminations in re Alivan Rea, et. al. v. Martin Marietta Corporation, Civil Action No. 91-S-1242, United States District Court, Colorado.
- Kelly, Haglund, Garnsey & Kahn, Denver, Colorado, 1992 – 1993  
Retained as expert and prepared offer of proof concerning congressional redistricting in re Martinez, et. al. v. Romer, Civil Action No. 91-C-1972, United States District Court, Colorado.
- ▣ Robinson, Waters, O'Dorisio and Rapson, Denver, Colorado, 1992  
**Deposed** as expert in preparation of lost-earnings analyses for termination with alleged age and ethnic discrimination in re Chan v. Apache Oil Corporation, Civil Action No. 90-M-1898, United States District Court, Colorado.
- Lundy Foundation, Denver, Colorado, 1992  
Designed and analyzed survey of AIDS/ARC service providers and users and authored survey report.
- Colorado Lawyers Committee, Voting Rights Task Force, Denver, 1992  
Conducted model study of minority voting patterns in Denver Colorado using ecological regression. Designed Colorado State House District creating a minority opportunity district and prepared expert demographic analysis in re Reapportionment of the Colorado General Assembly, Case No. 92 SA 19, Supreme Court, State of Colorado.
- ▣ Robinson, Waters, O'Dorisio and Rapson, Denver, Colorado, 1991

**Deposed** as expert witness in preparation of lost earnings analyses for termination with alleged age discrimination in re Mark Bremmer v. Martin Marietta Corporation, Civil Action No. 90-Z-828, United States District Court, Colorado.

David A. Lane, Esq, Denver, Colorado, 1989

Analyzed ethnic and age composition of the Qualified Jury Wheel and **testified** as expert concerning age bias in jury selection process in re U.S.A. V. Laymon, 89-CR-113, United States District Court, Colorado

Colorado Professional Black Firefighters, Paul A. Baca, Esq., 1989

Analyzed results of Denver Fire Department promotional exam for racial or ethnic bias and **testified** as an expert witness at the preliminary injunction hearing in re Fuller V. Cisneros, United States District Court.