

Pension obligation bonds – a case study: How one town quantified and mitigated the risks

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Pension obligation bonds are one tool a municipality or state may use to fund its defined benefit (DB) pension plan. Like most funding vehicles, they come with risks and possible rewards. This paper will outline the process that the Town of West Hartford, Connecticut, used to assess the associated risks and rewards, and the measures they put in place as part of their pension obligation bond package to reduce those risks.

Pension obligation bond mechanics

A pension plan has assets and liabilities. Each year, the plan's actuary determines how much the plan sponsor needs to contribute to the pension plan in order to have enough assets to pay for the promised benefits. This amount is called the Actuarially Determined Contribution and it typically consists of two pieces: a Normal Cost to cover the value of the benefits being earned that year, plus a Past Service Cost to systematically pay off any unfunded accrued liability. The Past Service Cost is a payment toward the funding shortfall on any benefits that have already been accrued by plan members.

A pension obligation bond (POB) is a taxable bond issued by a municipal or state entity (in this paper we use the term "plan sponsor" for the governmental entity that is responsible for paying the cost of pension benefits). The plan sponsor uses the bond proceeds to fund some or all of the pension plan's unfunded accrued liability, and then pays off the debt created by the POB over several years. Essentially, the plan sponsor eliminates some or all of the Past Service Cost portion of its annual contribution to the pension trust fund while at the same time incurring an annual debt service payment on the bonds. In the current low interest rate environment, the interest rates on taxable municipal bonds are at or below 3%. This creates the opportunity to borrow at a rate that is significantly lower than the assumed returns that the pension plan investments might earn over the long term, thereby reducing the plan sponsor's long-term cost. See Figure 1 for an illustration of the potential annual cost savings.

FIGURE 1: ANNUAL TOTAL PLAN SPONSOR COST

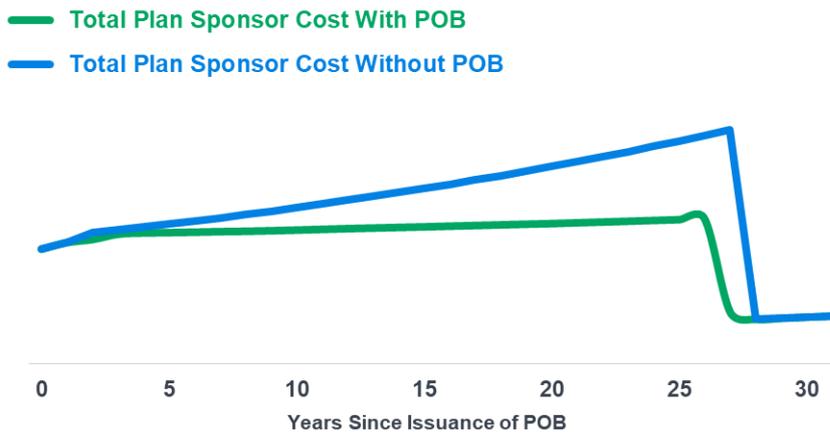
The *Normal Cost* portion of the pension contribution is unchanged



With bonds issued at 3%, the annual *Debt Repayments* are lower than the *Past Service Cost* would have been

One simple way to demonstrate the expected long-term outcome of offering a POB is to look at a deterministic projection. Such a projection shows relevant plan metrics over the lifetime of the bond based on a single fixed set of assumptions, including the future expected asset return. For example, it can show the plan sponsor's expected cost over the next 30 years in a hypothetical scenario where a bond is issued at 3.00% and the plan assets return 6.25% every year, as shown in Figure 2.

FIGURE 2: PROJECTED TOTAL PLAN SPONSOR COST, 6.25% INVESTMENT RETURNS IN ALL YEARS



This projection clearly shows that, for this particular investment return scenario, the plan sponsor's cost will be lower over the next 30 years with the POB than without it. This is not surprising, because on a simplistic level the plan sponsor would be borrowing at 3.00% and investing at 6.25%.

The risks

While Figures 1 and 2 make POBs look quite attractive, these bonds carry considerable risk. Most importantly, the investment returns on the pension plan's assets may be significantly lower than expected over the bond repayment period. If the assets underperform relative to the actuarial assumption, then the pension plan's funded status will worsen and the plan sponsor's annual contributions will increase. On top of that, the plan sponsor will still have to pay the bond payments. If the asset performance is bad enough, the plan sponsor's total cost (the contributions to the pension plan plus the debt payments) over the bond repayment period may exceed what the contributions would have been without a POB.

On the flip side, the investment returns on the pension plan's assets may be significantly *higher* than expected, which might have made the plan fully funded without issuing a POB. Generally speaking, surplus assets cannot be taken out of a pension trust so the plan sponsor might end up with an overfunded pension plan while still having to make debt payments on the POB. This would cause the plan sponsor's total cost over the bond repayment period to be higher with a POB than without.

In other words, depending on what happens in the financial markets over the bond repayment period, a POB could actually increase the plan sponsor's cost instead of producing a cost savings, and this is most likely to occur at the extremes, with either very low sustained investment returns or very high sustained investment returns.

Of course, pension plan assets are always exposed to investment risk, but with a POB the pension plan has more assets and therefore is exposed to more investment risk. Consider a numerical example. If a pension plan had \$100 million in assets prior to issuing a POB, a -10% return would result in a loss of \$10 million. If a POB was issued that increased the plan assets to \$200 million, the same -10% return would result in a loss of \$20 million.

In addition to the investment risks and possible increased costs due to market performance, the Government Finance Officers Association (GFOA) identifies the following risks associated with issuing a POB:¹

- POBs may have complex investment features such as swaps or derivatives, which may expose the plan sponsor to credit risk and interest rate risk
- Issuing taxable debt uses up the plan sponsor's debt capacity and could reduce its ability to issue debt for other purposes
- Issuing POBs may have a negative effect on the plan sponsor's credit rating

There are also legal implications that the plan sponsor should explore. For instance, there may be state laws that govern when POBs may be issued, subject them to state review or approval, or impose additional limitations on the pension plan and/or the plan sponsor as a result of the POBs.

¹ GFOA. Advisories: Pension Obligation Bonds. Retrieved March 25, 2021, from <https://www.gfoa.org/materials/pension-obligation-bonds>.

Quantifying the risks

As we illustrated in Figures 1 and 2 above, the cost savings associated with the POB depend on the pension plan's investments achieving a certain level of returns during the bond repayment period. Investment risk is therefore the biggest risk a plan sponsor faces when issuing these bonds. It is certain that the plan's assets will *not* return exactly the assumed rate of return every year, and nobody can predict exactly what the year-by-year returns will be. Thus, it is critically important for all of the stakeholders to have a clear picture of the risks and rewards involved when deciding whether or not to issue POBs. Some of the risks are difficult to measure but, as actuaries, we are well positioned to help sponsors quantify the risks associated with future market performance.

WEST HARTFORD, CONNECTICUT

West Hartford, Connecticut, had been considering offering POBs for several years and came to Milliman for support in assessing the investment risks. The Town is an affluent suburb of the state's capital city, with a AAA credit rating and a healthy tax base. Unlike other communities that have been in the news for issuing POBs, West Hartford is not financially distressed but wanted to take advantage of the historically low interest rates, as long as the risks were manageable. The Town also wanted to significantly improve the funded status of its pension plan, which was about 40% funded. Like many other municipalities, West Hartford had seen a decline in the plan's funded status and an increase in its annual pension contributions over the past decade. These trends were a result of market downturns and economic and demographic changes (notably, lower interest rates and longer life expectancies) and the resulting gradual strengthening of the actuarial assumptions that are used to value its liabilities. Given this combination of circumstances, the Town leaders concluded that a POB was worth exploring.

OUR STOCHASTIC PROJECTION MODEL

In order to assist West Hartford with quantifying the investment risks, the Milliman team developed a stochastic projection model, which provides numerical analysis of the pension plan's future contributions and funded status. The model takes 10,000 randomly generated 30-year investment return scenarios and calculates the Town's pension costs under each of these scenarios over the bond repayment term. The model can simultaneously explore the financial outcomes both with the issuance of a POB and without a POB. The model includes a robust set of inputs and outputs that allow the user to receive quantitative answers to such questions as:

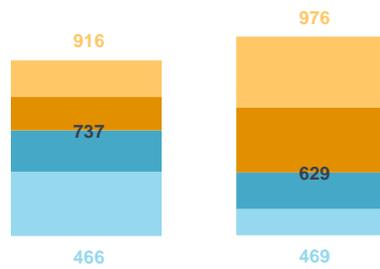
- What is the overall Town cost over the life of the POB?
- How high could the Town's cost be in any one year?
- How well funded will the plan be at the end of the bond repayment period?
- How will a change in the plan's investment allocation, funding policy, bond amount, repayment period, or bond interest rate affect the above outcomes?

The power of the model comes from the fact that it produces results for 10,000 different scenarios, not just one deterministic scenario at a time. The results of the many scenarios can then be summarized into percentiles, as shown in Figure 3. This chart shows the median outcome (the numbers in black), which can be thought of as the "middle" outcome, as well as how spread-out the worst and best outcomes are (from the 5th percentile numbers in blue to the 95th percentile numbers in orange). The user can also look at how many scenarios result in a Town cost that would be higher with the POB than without. All of these data points help quantify the risk that the POB may increase the Town's costs. In this example, which measures the net present value of the Town's cost over a 30-year period, you can see that the median Town cost is significantly lower with a POB (\$629 million) than without a POB (\$737 million). However, the worst-case scenarios (those at the 95th percentile and above) produce higher costs in the POB scenario. Also of note, the worst-case scenarios with the POB have a large range of outcomes, while the low-cost scenarios have a small range. Without the POB, the reverse is true: there is a smaller range of worst-case outcomes but a larger range of low-cost scenarios. In other words, with the POB there is more risk of the Town cost exceeding the "expected" outcome, but for the majority of outcomes the cost is less than it would be without the POB.

FIGURE 3: STOCHASTIC MODEL OUTPUT: NET PRESENT VALUE OF TOWN COST (\$ MILLIONS)

Output from 10,000 scenarios:

- 95th percentile**
95% of outcomes are this amount or lower
- 75th percentile**
75% of outcomes are this amount or lower
- Median**
50% of outcomes are this amount or lower
- 25th percentile**
25% of outcomes are this amount or lower
- 5th percentile**
5% of outcomes are this amount or lower



No POB With POB

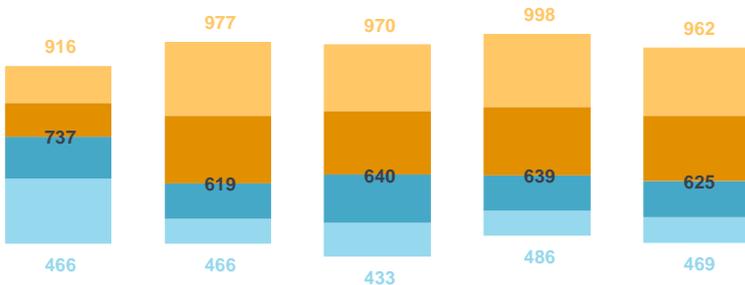
We can extend this type of stochastic analysis to evaluate how changing certain aspects of the POB would impact the risk/reward picture. By running many different combinations of possible POB parameters through the stochastic model, West Hartford was able to evaluate the impact of a wide variety of elements of the POB package:

- Length of the bond repayment period: What if the period is 20 years? 25 years? 30 years?
- Bond interest rate: What if the bonds can be issued at 2.5%? 3.0%? 3.5%?
- Amount of POB issuance: What if POBs are issued to get the plan to be funded at the 80% level? 90%? 100%?
- Actuarial assumptions: What if the interest rate assumption is 6.50%? 6.25%? 6.00%?
- Funding policy: What if the Normal Cost continues to be funded even when the plan is modestly overfunded?
- Reserve fund usage: What if the Town establishes a reserve fund to protect the operating budget from large year-over-year increases in the pension contribution?
- Asset allocation policy: What if the target asset allocation is more conservative? Less conservative? Note that our model assumed that the selected asset allocation remains fixed throughout the projection period, but the model could include a change to the asset allocation in a future year (for example, if certain funding targets are reached).
- Dollar cost averaging: What if the POB proceeds are gradually invested over a period of time rather than all at once?

Figure 4 shows model output for four different combinations of POB elements.

FIGURE 4: NET PRESENT VALUE OF TOWN COST: VARIOUS POB PACKAGES

- 95th percentile**
95% of outcomes are this amount or lower
- 75th percentile**
75% of outcomes are this amount or lower
- Median**
50% of outcomes are this amount or lower
- 25th percentile**
25% of outcomes are this amount or lower
- 5th percentile**
5% of outcomes are this amount or lower



No POB With POB
Baseline **Lower Issuance Amount** **Higher Bond Rate** **Shorter Bond Period**

The overall cost to West Hartford over the life of the POB is an important metric to consider, but there are others. For instance, Figure 5 illustrates a different metric: how high might the Town’s cost be in any one given year?

FIGURE 5: STOCHASTIC MODEL OUTPUT: HIGHEST ONE-YEAR TOWN COST (\$ MILLIONS)

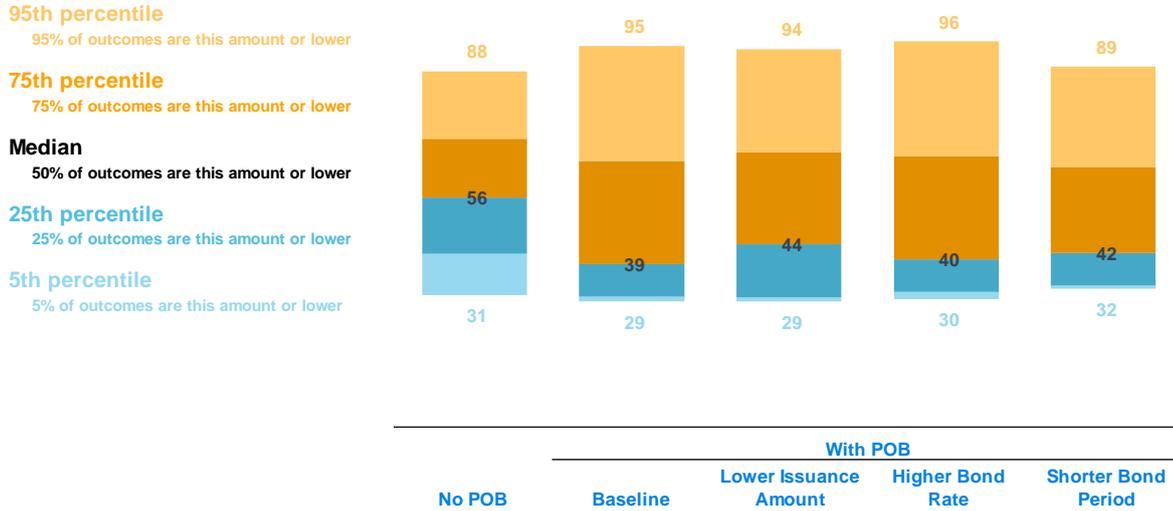
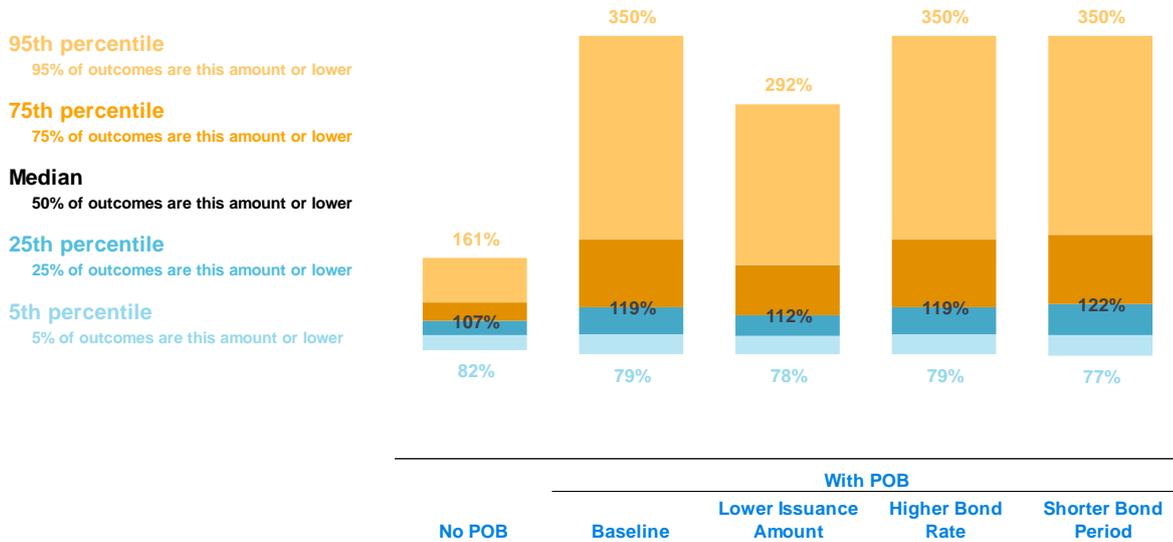


Figure 6 illustrates a third metric: what is the plan’s funded ratio likely to be at the end of the POB repayment period?

FIGURE 6: STOCHASTIC MODEL OUTPUT: FUNDED RATIO AT END OF PROJECTION PERIOD



In this example, the median funded status is above 100% for all the scenarios because the funding policy being modeled includes the provision that West Hartford will continue to contribute the Normal Cost as long as the funded ratio is below 150%. (See the Strong Funding Policy section below for a discussion of this provision.) The funded status under the best scenarios is significantly higher under the POB scenarios as compared to the “no POB” scenario because there are significantly more assets in the pension trust. A plan sponsor might consider an investment policy that includes moving to a more conservative asset allocation once a certain overfunded target, such as 120% or 150%, is reached.

By analyzing the impact of these different factors on various metrics, West Hartford was able to construct a POB package that best met its needs.

Mitigating the risks

After considering the risks and rewards involved, West Hartford added some features to the POB structure in order to control the risk.

CONSERVATIVE ASSUMPTIONS

The interest rate assumption, which reflects the expected long-term return on the plan's investments, is a significant factor in measuring a plan's funded status and determining annual contributions. It is therefore an important consideration in assessing the potential cost savings of issuing POBs. Based on Milliman's June 30, 2019, Capital Market Assumptions and West Hartford's target asset allocation, we determined that the long-term expected compound return was 6.31%. To add a measure of conservatism to the POB analysis, the Town used an interest rate assumption of 6.25% in the modeling.

DOLLAR COST AVERAGING THE INVESTMENT OF THE BOND PROCEEDS

One danger faced by POBs is the possibility that financial markets suffer a decline immediately after issuance. In order to combat this risk, West Hartford decided to invest the bond proceeds gradually in order to avoid a large asset loss on the bond proceeds shortly after issuance. In consultation with its investment consultant, the Town's plan is to deposit the bond proceeds into the pension trust immediately upon issuance, but invest the proceeds initially in low-yielding, safe investments. The proceeds will be transferred gradually into long-term investments over a period of at least six quarters. While there is a chance that this dollar cost averaging approach will result in lower returns if markets are strong, it will protect against losses if markets fall soon after the bonds are issued. As a result, any market downturns immediately after the bonds are issued will have a smaller negative impact on the pension fund.

STRONG FUNDING POLICY

When pension plans become overfunded, plan sponsors typically elect to use the surplus to offset the Normal Cost portion of their annual contribution. If the surplus is large enough, plan sponsors often take a "contribution holiday" and make no contributions at all. This results in the surplus being reduced over time. West Hartford decided that it would be preferable to deliberately use investment gains to build up a surplus in good times, which would provide a cushion against market downturns. The Town accordingly strengthened its pension funding policy by deciding to continue to fund the Normal Cost even if the plan becomes modestly overfunded—up to 150% funded. They will only take a contribution holiday if the funded ratio climbs above 150%.

A RESERVE FUND

West Hartford's Director of Financial Services, Peter Privitera, proposed setting up a special reserve fund that could be used to offset any sharp increases in future contributions. The reserve fund is a general Town fund, not a pension asset, but it is established by an ordinance that only permits it to be used to pay a portion of the pension contribution when certain criteria are met. The reserve fund will be created using the monies the Town would have otherwise budgeted to pay the pension contribution in the year in which the POB is issued. Because the bond proceeds cover any contribution that is required for that year, no contribution is needed from the Town and those budgeted funds are available to set up the reserve fund. The ordinance provides that the reserve fund can be drawn upon in situations where there is a year-over-year contribution increase of more than 5%. Should this occur, the Town's operating budget would pay the first 5% of the contribution increase and the reserve fund would pay the remainder. This provides the Town's operating budget with more stability and predictability in the face of unpredictable investment markets.

Figure 7 shows a numerical example of how the reserve fund mechanism will work. In this example, the actuarially determined contribution increases from \$9.7 million in year 5 to \$10.7 million in year 6—a 10% increase. The Town increase is capped at 5% (or \$0.5 million in this case), so the Town general fund pays \$10.2 million in pension contributions in year 6, while the reserve fund covers the remaining \$0.5 million. The debt payment is fixed in both years.

FIGURE 7: RESERVE FUND ILLUSTRATION



The stochastic modeling indicated that in nearly 98% of the scenarios there would be some level of reserve fund assets still remaining at the end of the bond repayment period. This indicates that the reserve fund is very likely to provide budgetary protection throughout the bond repayment period. As a final protection, the reserve fund ordinance provides that reserve fund monies cannot be used for purposes *other* than pension contributions unless there are no bonds outstanding or if rigorous stochastic actuarial analysis demonstrates that the pension plan is sufficiently well-funded.

ADDRESSING THE GFOA CONCERNS

Finally, West Hartford addressed the GFOA concerns regarding POBs by:

- Structuring the bonds without any complicated debt features
- Limiting the bond issuance to an amount that is well below the Town’s debt capacity
- Consulting with its financial advisor regarding the likely credit rating implications of issuing the POBs

THE RISK/REWARD TRADE-OFF

Each of these mitigation measures represents a trade-off: they lessen West Hartford’s risk, while giving up some of the reward. By investing the bond proceeds gradually, the impact of any immediate negative market returns is lessened, but any positive short-term returns are only partially felt as well. By contributing the normal cost even when the plan is modestly overfunded, the Town builds up a cushion against future adverse experience, but increases the chance of the plan becoming overfunded and contributing more than necessary. By instituting a reserve fund that is invested conservatively, the Town could miss out on additional investment returns or on using those funds for other purposes, but adds a measure of budget stability. We were able to use our model to quantify the cost impact of adding each of these features, which helped the Town assess whether each trade-off was worthwhile.

FIGURE 8: WEST HARTFORD POB PACKAGE FEATURES: RISKS VS. REWARDS



PLAN GOVERNANCE AND FUNDING POLICY

It is important to note that in order for the POBs to have a positive outcome, the pension plan should have proper governance, a sound funding policy, and a commitment to follow that policy. These criteria are key to any healthy pension plan, but especially so if a POB is involved. Without reasonable assumptions and a sound funding policy, actual Town costs could turn out to be significantly higher than expected, presenting budget challenges and even bond default. In West Hartford's case, the pension board is committed to appropriate funding measures. In addition, Connecticut law has several provisions in place that help ensure proper funding and governance:

- The state conducts a detailed review of the POB issuance
- The Town is required to contribute the full Actuarially Determined Contribution as long as there are outstanding POBs
- There are limitations on the pension plan's funding policy (such as the amortization period) once POBs are issued

Conclusion

Pension obligation bonds may be an attractive pension funding tool in today's interest rate environment, but they expose a plan sponsor to considerable risks. It is critical that plan sponsors and all stakeholders understand these risks and consult with various professionals before making any decisions regarding POBs. The plan's actuary, investment advisor, legal counsel, and a financial advisor who specializes in municipal bonds should all be involved in advising the plan sponsor during the decision-making process and during implementation if a POB is offered. The plan sponsor should also consider having a stochastic projection prepared so it can thoroughly assess the investment risks in a quantitative manner. Finally, if the plan sponsor decides to issue POBs, it should consider features such as the ones the West Hartford included in its POB package to help lessen the plan sponsor's risks.

Caveats and limitations

Yelena Pelletier is a consulting actuary at Milliman. She is a Member of the American Academy of Actuaries and meets the qualification standards of the Academy to render the actuarial opinion contained herein. To the best of my knowledge and belief, this information is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices.

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This paper is intended to present the possible risks and rewards of pension obligation bonds (POBs), one plan sponsor's POB design, and the modeling Milliman prepared to assess these risks. This information may not be appropriate, and should not be used, for other purposes. We do not intend this information to benefit, and assume no duty of liability to, any third party that receives this work product. Any third-party recipient of this report that desires professional guidance should not rely upon Milliman's work product, but should engage qualified professionals for advice appropriate to its specific needs.



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