

August 13, 2012

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Executive Summary

Background

The PBGC provides financial assistance to multiemployer (ME) plans upon insolvency to ensure the continued payment of benefits to retirees and their beneficiaries. PBGC insures about 1,400 on-going ME plans and currently provides financial assistance to about ten plans. The maturing liabilities in most ME plans, weak portfolio returns, and the declining number of participating employers (sometimes the most financially healthy) is putting increasing financial stress on the PBGC in terms of the current and projected needs for financial assistance. Total projected assistance has been increasing rapidly over the past few years. The critical role of the PBGC in ensuring the financial well-being of members in their post-employment years is ever increasing in both importance and complexity, and the need for increasingly robust means of risk monitoring is essential to the PBGC mission.

Statement of Work

The PBCG engaged Buck Consultants to perform a peer review with respect to its ME pension insurance modeling system (ME-PIMS) to:

- evaluate the soundness of the economic and statistical theory and actuarial principles that underlie ME-PIMS;
- assess the accuracy, completeness and consistency of input data, the performance of data integrity checks, a review of underlying processes used to obtain the data, and a review of critical assumptions (e.g., parameter calibration, to confirm consistency with the observable market);
- perform a robust review of critical actuarial and statistical calculations (e.g., funding requirements, projected contributions, plan liabilities, current and projected probability distributions);
- assess the reasonableness of key assumptions used in ME-PIMS (e.g., population growth or decline, mass withdrawal assumptions, etc.);

- assess the reasonableness and accuracy of model calibration and output, (comparing projected vs. realized outcomes for the period that begins with the date from which the data is drawn to the present day);
- benchmark (e.g., comparing the ME-PIMS actuarial valuations to those of an industry-established actuarial valuation system),
- stress-test (limiting-case and extreme-value testing) and perform sensitivity analysis (examining the degree to which model output is affected by changes in selected input parameters);
- assess the degree to which the methods used to: (i) project demographic and economic patterns, (ii) calculate probability distributions and (iii) rank risk are based on robust actuarial and statistical techniques and economic theory;
- assess the accuracy and relevancy of the information reported to management and whether the ME-PIMS's reports provide reasonable and timely results, clearly and concisely capture critical elements for decision making, and provide an executive summary, a clear statement of the purpose of a particular modeling exercise, and a summary of major assumptions to highlight the ME-PIMS limitations;
- recommend changes, as appropriate, to ME-PIMS data collections, programming, and reporting.

Report Summary

We would like to commend the PBGC for undertaking this effort to request an independent outside review of its ME-PIMS system. We appreciate that this type of examination, while important, also has its challenges. It is our hope that the PBGC will view our comments as they are intended -- to be constructive and in the spirit of a collaborative effort to improve its ongoing risk assessment and risk management efforts.

As we proceeded through this review, it became apparent that our suggestions for improvement had a couple of main dimensions to consider. The first dimension was the necessity of a change to the risk measurement and management effort. The second was the feasibility of the change. We considered them in tandem and structured our conclusions accordingly into three main categories, namely:

- **Category 1** - Changes that we believe every possible measure should be taken to review and change the system and that we believe are doable in the short-term.
- **Category 2** - Changes that we think are important and should be made, but where we think they are less urgent than Category 1 when the potential effort needed to implement them is taken into account.
- **Category 3** – Changes that may be nice to have but that are less critical than the prior categories.

Category 1 suggestions entail areas where we believe that the ME-PIMS assumptions are not as realistic as they could be with respect to trends in the ME universe. The good news here is that in-so-far as the PBGC is in agreement with our suggestions, these changes pertain to modeling assumptions or reporting items that we believe can generally be made to the existing modeling framework and processing without undue burdens. These are areas that we believe have a high probability of having a material impact on PBGC's reported financial position.

Category 2 suggestions tend to pertain more to areas where ME-PIMS seems outdated and needs updating in terms of some of the models employed, and the structure and ease of use of the output to facilitate adequate checking of results. These may include suggestions that would be much more difficult, time-consuming and expensive to change, and for which we don't have enough of a basis to make a reasonable judgment about whether or not such changes would have a material impact on results.

Category 3 suggestions tend to be ones which, in our judgment, are worthwhile changes, but which are not likely to have a material impact on the results.

It is certainly worth noting that we found many important areas where we believe the current system works just fine and for which we had no significant suggestions. We will summarize those key areas in the report as well. With respect to our suggested changes, we believe there are a number of detailed areas that need improvement; some of which we believe significantly understate PBGC's exposure, and other areas that may well be overstating the exposure. As such, it is difficult for us to make a definitive statement at this time as to whether or not in the aggregate the current results are likely to be overstated or understated.

The body of the report will set forth such areas noted above regarding important areas where we are in agreement with the current system, followed by details on our suggested improvements to the system and our comments regarding PBGC's reporting of its financial position.

Related to the above, PBGC asked Buck to comment on issues that had already been self-reported (the "Known Issues under Review for Future Maintenance/Development" document dated February 10, 2012). Some of these issues are covered in the main body of our report – many are not. However, we have included as Appendix A to the report a detailed commentary on these issues, insofar as we encountered such issues in our review and/or felt we had the wherewithal to provide such commentary. Also enclosed is Appendix B, which discusses in more detail Buck's Capital Market Modeling tool which was used as the basis of comparison to the current modeling approach in ME-PIMS. We did not include this in an attempt to place undue emphasis on the capital market modeling aspect of ME-PIMS, but rather to fully inform the PBGC regarding the model while maintaining a more streamlined body of the report.

Actuarial Certification

As consulting actuaries, Buck performs actuarial and consulting services for PBGC, both on an ongoing and special project basis. However, we do not have any relationship with the PBGC which we believe would impair or appear to impair the objectivity of our work.

We meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained in this report. In addition, Darren French is an Enrolled Actuary and an Associate of the Society of Actuaries and Kai Petersen is a Fellow of the Society of Actuaries, an Enrolled Actuary, and a Charterholder in the CFA Institute.

We welcome the opportunity to discuss these results in more detail at your convenience.

Sincerely,



Kai Petersen, F.S.A., E.A., C.F.A., M.A.A.A
Principal and Investment Consulting Actuary



Darren French, A.S.A., E.A., M.A.A.A.
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Important Areas Where We Agree

i. Plan Sampling Method

The ME-PIMS program runs complete projection programs on a sample of 150 out of a total ME universe of roughly 1,400 ME plans not currently terminated or booked, and on 23 terminated or booked plans. We focused our review primarily on the sample of 150 on-going plans. That sample includes most of the largest plans in the universe of ME plans as well as a reasonable sample of various mid-size and smaller plans, with a weighting factor to ratio-up the sample results to approximate the universe of all ME plans (larger factors are used for the smaller plans and smaller factors are used for the larger plans). Based on the testing that Buck performed and our general knowledge of the ME universe, we believe that the sampling method provides a good balance between accuracy and efficiency. Also, based on a sample of 15 of the 150 plans for which Buck reviewed the results on a detailed basis, and factoring that up for the actual 150 plans in PBGC's sample, we found similar answers in terms of the mean projected financial position using just those 15 plans as for the 150 plans.

ii. Capital Market Models and Asset Mix

The issues of the capital markets model and asset mix modeling are somewhat intertwined, and as such are discussed somewhat in tandem in this report. In general we believe that the type of capital markets model used by the PBGC is of the type that has been used historically and in that respect it is not an unreasonable approach. That said, we think that changes to the portfolio modeling are necessary and will have further comments on this later in the report.

Category 1 – Commentary/Recommended Changes:

i. Criteria for Booking Claims

PBGC's criteria for booking claims for ME plans is if a plan meets one of two tests: (1) for terminated plans, projected insolvency in the next 20 years, and (2) for on-going plans, projected insolvency within 10 years. We recognize that system constraints may effectively limit how many years the program can project out and still be able to run in an acceptable amount of time and using acceptable amounts of resources. However, since the program is already projecting out 20 years, and recognizing that relatively few on-going plans are likely to become insolvent in 10 years, but may well be likely to run dry over a longer period of time, it would appear to be a relatively easy improvement to use the 20 year rule for on-going plans as well as for terminated plans. The extra 10 years, in fact, is probably much more meaningful for ongoing plans than terminated plans. Ideally, we believe that the projection period should go beyond 20 years, as we can see many plans that may not run out of assets in the next 20 years and yet could represent a large and significant liability to the PBGC. If the programming were modernized this might be readily achievable (see the later section on "Use of the ME-PIMS" for more details).

ii. Population Projection Assumptions

Overall, the stochastic model has a mean assumption of essentially no increase and no decline in active population in the future. Based on what we have seen historically, and what many plans are using for Funding Improvement Plan and Rehabilitation Plan assumptions, a decline seems imminent, and at least some significant decline assumption should be the mean result of ME-PIMS. We suggest reviewing the movement in active population in both the last 10 years for selected plans and for the ME universe in aggregate (if available) as well as perhaps select Funding Improvement Plans and Rehabilitation Plans. One assumption that we think might be reasonable would be a mean assumption of a 1.5% per year decline in future active participants among ME plans in general -- ideally such assumption would vary by plan, perhaps as a function of past declines, and future expected contribution increase rates). Based on a very simplified model and a small sample, we estimate that such an assumption change would increase PBGC's projected mean net position in years 12-20 by something in the ballpark of 15%-20%.

iii. Contribution Projection Issues

One issue that we found perplexing was the fact that, while information for most plans had been entered into the system from the 2009 Schedule MB, the 2009 contributions from the Schedule MB were not used as the basis for the projections. Rather, 2007 contributions entered in the past from the 2007 Schedule B were used and 2009 contributions were projected from the 2007 actual contributions. In a sample of 15 plans that we reviewed in some detail (and which represent a very significant portion of the ME universe – in 2009, about 1.0 million active participants, 2.6 million total participants, and \$90 billion in assets), on average the 2009 projected contributions in ME-PIMS were 23% higher than the actual 2009 contributions reported on the 2009 Schedule MB. In reviewing the contribution projection methodology, we think that the level of increases factored into the programming are unrealistically high, especially given that, in many cases, while the contributions are increasing two to four fold over the next 10 years or so, the benefit accruals are being

drastically reduced or even eliminated. In our experience, Trustees of most ME plans will not approve Rehabilitation Plans with such extremes, on the basis that such draconian demands would result in mass exodus of employers from the plans. The disconnect stems largely due to the fact that ME-PIMS explicitly does not account for the “exhaustion-of-reasonable-measures clause” (see the following section on Funding Improvement Plan / Rehabilitation Plan Hierarchy for more details).

In our detailed review of 15 plans, we found the following: an average increase in contributions of over three-fold during the first 12 years of the projection period, from an average per capita of \$6,600 per year going to an average of \$22,000 per year, and the two highest going from \$11,300 to \$73,100 and from \$15,300 to \$41,800. (The per capita figures were derived from the total annual contributions divided by the total active participant counts.) Based on our experience, these figures don't appear to be realistic, especially if participants are accruing little or no benefits during this period.

Our overall conclusion is that the projected contributions far exceeds what we think are likely expectations, and thus, based only on this one aspect, the projected PBGC liabilities would likely be significantly understated. For example, if the baseline contributions were reset to the actual amounts on the Schedule MB (i.e., 23% lower based on the sample of 15 we reviewed), and the annual increase rate for the first 12 years were lowered by 2% per annum (from an average of about 10% per annum to about 8% per annum based on our sample of 15), we estimate an increase in PBGC's projected mean net position in years 12-20 of something in the ballpark of 20%-30%.

iv. Funding Improvement Plan/Rehabilitation Plan Hierarchy

ME-PIMS has a specific six-step hierarchy for determining steps that the trustees of the plans are assumed to take when a plan is or is projected to be in endangered or critical status. While the steps appear reasonable in theory, in reality the severity of the steps, both in terms of annual contribution increases, as well as the benefit reductions, does not appear to us to be realistic or in-line with the actions we have seen ME plans actually take. One significant issue here is that the projection program is not accounting for the “exhaustion-of-reasonable-measures clause” (IRC Section 432(e)(3)(A)(ii)) -- whereby the Trustees determine that any further “pain” to the employers or the participants will do more harm than good (i.e., if contribution increases are too high, companies have too much incentive to attempt to withdraw, and if benefits are too low, the union has little incentive to push hard in negotiations to keep their participants in the plan), and thus such plans are run allowing for a longer period than 10 years to exit critical status -- or might never exit critical status. The determination of when a plan's Trustees will determine that all reasonable measures have been taken and thus the plan cannot exit critical status in accordance with the appropriate time frame under the law (without taking into account the “exhaustion clause”) is difficult to model. It is not a “bright-line” test and in fact is very subjective (at least with no regulations in place). However, not taking it into account is likely substantially understating PBGC's liabilities. This is a key area where we suggest further study.

v. Employer Withdrawal and Mass Withdrawal Methods and Assumptions

The documentation for ME-PIMS shows a complex series of formulas to determine the probably of mass withdrawal occurring, based on PBGC's experience with incidence of mass withdrawal in the past. The formulas seem to provide for reasonable probabilities of mass

withdrawal in most situations, but they are not intuitive to follow and may be needlessly complex, therefore perhaps resulting at times in unintended anomalies. Moreover, we believe that PPA-2006 may have changed the dynamics regarding the incidence of mass withdrawal, as PPA allows plans to go temporarily into a funding deficiency without excise tax consequences and effectively allows some plans to indefinitely have a funding deficiency. The current formulas appear to put heavy emphasis on any funding deficiency in determining a high likelihood of mass withdrawal.

Once a mass withdrawal is projected to occur, ME-PIMS assumes (according to the documentation) that 60% of the employers stop making contributions and that only 40% proceed to make withdrawal liability payments. Our detailed review of 15 plans seems to more or less confirm that the 40% payer rate is being used by the program, though it appears to work off of any recent high amount (and in some cases could not be explained based on the documentation). While we don't have significant experience with plans in mass withdrawal, we would have expected a much higher initial payment percentage. In normal withdrawal situations (which are often caused by bankruptcy or other severe financial conditions of individual employers involved), we might expect to see such high rates of non-payment, but the mass withdrawal situation would not necessarily be triggered by employers at all or at least not because of any immediate financial condition of such employers. It may in fact be a calculated design that might help save the employers from financial ruin.

ME-PIMS is determining the mass withdrawal payment amount as if each fund were one employer – given the uneven contribution base units typically seen among employer groups (and sometimes different contribution rates among various units or employee classes of the same employer), this probably understates the payment amount by perhaps 10% to 30%. That, combined with the 60% non-payment assumption upon mass withdrawal, would appear to significantly understate mass withdrawal liability payments. There does appear to be a decay rate after the first year, but the formula has not yet been ascertained by Buck. Reviewing a sample of the 15 plans, in some cases it does decay at a reasonable rate; in other cases it does not decay at all. The latter assumption, of course, does not appear to be realistic. This factor would go in the other direction from the above two factors in terms of impact on PBGC's liabilities – we need to receive more information on this, and in any event, we believe this issue needs more study. Finally, in our experience, employers often wish to “settle” the withdrawal liability payments in a lump sum and the trustees are typically willing to do so in order to avoid any further non-payment risk, and sometimes to help short-term cash flow. While each fund handles the lump sum settlement issue differently, and individual circumstances are usually taken into account, a general rule of thumb would be for the settlements to discount for interest (typically at the valuation rate) and for the non-payment risk (at perhaps 1% to 2% per year).

Category 2 – Commentary/Recommended Changes:

i. Capital Market Models and Asset Mix

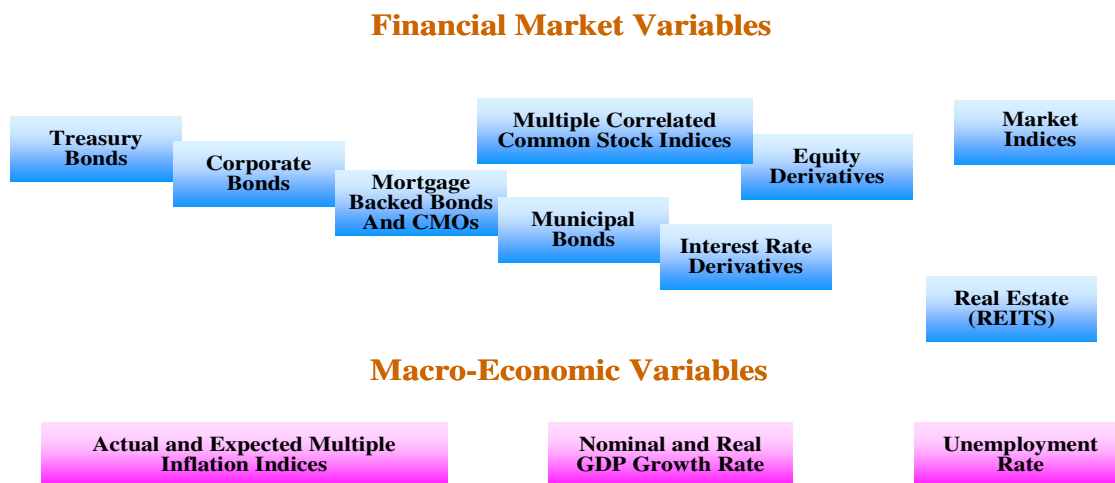
We have included a discussion of the capital markets model here in Category 1 because the asset modeling currently being used does not reflect current investment trends with respect to the breadth of asset classes that pension plans have exposure to. One way to address the asset breadth issue would be to buy results from a vendor that has a capital markets model that could be loaded into ME-PIMS. This would not require the PBGC to expend extensive effort building a model. Further in doing so, the PBGC may be able to upgrade its methodology by gaining access to a model that has some desirable features that could marginally improve the risk assessment. In so far as the PBGC cannot purchase results from a model, and therefore has to buy or build a full model, then we would move this issue to Category 2 to reflect the greater financial and/or work effort involved in implementation.

The discussion below is intended to familiarize the PBGC with the type of model from which results could potentially be obtained.

a. Benchmark Capital Market Model

Buck models asset returns and interest rate environments using an economic scenario generator that forecasts global economic environments in terms of key economic variables, and then models asset class returns and term structures using the multifactor model for the underlying economic environments being forecasted. See Appendix B for more information on this model.

Key primary simulated variables are depicted below.



b. ME-PIMS Capital Market Model

In contrast, the ME-PIMS employs what is generally a parameter based process rather than an econometric model to simulate asset class returns. This general approach to capital market modeling has been common in the past due its relative ease of implementation. In a

parametric capital market model a small number of variables are used to define asset class returns and inter-relationships which are then processed using a program that will run simulations according to the parameters input. Probably the most well-known model is a mean variance model in which asset class means, standard deviations (proxy for risk), and correlations are specified and from this information, asset class and portfolio returns can be simulated. ME-PIMS uses returns that are based on log-normal model which is not an atypical parametric modeling approach.

Chief among the advantages of a parameter based approach is its relative computational simplicity and ease of understanding. Also, relative simplicity does not mean that the model is inadequate for a particular purpose.

Probably the most significant disadvantages are:

- 1) Model parameters that reasonably reflect future, rather than past, conditions need to be established.
- 2) Certain “real world” phenomena that may not be as fully capture as possible with an econometric model. Examples of this would be “fat tail” events and dynamically changing asset class interactions (correlations and variances) in different economic and capital market conditions. What we experienced in 2008 would be illustrative of this.
- 3) It is difficult to link particular economic environments to portfolio returns, which can be useful in stress testing and framing discussions about risk around environments of varying degrees of likelihood. It is not uncommon to think of future environment in terms of macro- economic conditions rather than portfolio outcomes. For example a particular viewpoint on interest rates may be embedded with certain scenarios produced by the model, but these scenarios would be difficult to identify and access directly. One would have to hypothesize a particular impact of an economic environment and “mine” for asset return scenarios that match the hypothesized impact.

We are not suggesting that the current model is “wrong” however it may be less robust at the margins with respect to accessing certain economic events and their the likelihood and quantifying the impact.

Setting aside the differences in modeling and comparing the Buck and ME-PIMS model asset class assumptions, at a macro level we do not see out of the ordinary differences in the returns generated in the aggregate over the ME-PIMS modeling time horizon. The table below shows side by side the key capital market assumptions for ME-PIMS model and the Buck model.

	ME - PIMS			Benchmark 20-Year Result		
	<i>Equities</i>	<i>Treasuries</i>	<i>Cash</i>	<i>Equities</i>	<i>Treasuries</i>	<i>Cash</i>
Arithmetic Avg.	8.56%	3.25%	3.32%	9.89%	3.93%	0.81%
St. Deviation	20.33	7.38	1.29	17.69	6.24	0.58

ME-PIMS assumptions are slightly more conservative than Buck's 2012 20-year assumptions. Results obtained by comparing ME-PIMS to other models might result in other conclusions about the relative degree of conservatism in the ME-PIMS assumptions.

ii. Asset Mixes

ME-PIMS assumes a 60% Equity / 40% Fixed Income asset allocation. From a historical perspective, this would not be considered an unreasonable asset allocation to assume if one endeavors to select one asset mix that would be reasonably reflective of the long term investment strategy of a cross-section of ME plans. However, given current day computational capabilities, and trends in pension investing, this approach is suboptimal.

There is a clear trend in pension investing toward broader diversification to gain the risk management and return enhancing benefits of diversification. Equities, which have been viewed in the past as having a high potential to drive positive returns are more and more being viewed as contributing a disproportionate share of the risk of a portfolio. A pension plan's 60% allocation on a dollar basis could be contributing 90-95% of the portfolio's risk. Hence, the general move away from equities. Fixed income assets have performed relatively well in the past due to a secular decline in interest rates, which has given rise to price appreciation. This trend could reverse in the future. A view held by many (and reflected in the benchmark model) is that given the current low interest rate/inflation environment (by historical standards), it is more likely that interest rates will rise rather than fall over the longer term. In the shorter term, there is an acknowledgement that monetary policy decisions may mitigate this for a period of time. If interest rates rise as many expect them to, this will result in bond price depreciation.

There is a trend toward increased geographic and asset class diversification through global investing (e.g. emerging markets) and exposure to various alternative asset classes and investment strategies such as real assets, private equity, and hedge fund strategies. This has implications for asset modeling in ME-PIMS. Consider the asset mixes and associated expected returns of several plans in ME-PIMS based on Buck's 2012 capital market assumptions. As shown in the table below, there are substantial differences in expected returns across the various mixes when compared to the 60% equity / 40% fixed income asset mix assumed in ME-PIMS. Comparable differences could result when comparing ME-PIMS to other models as well.

	ME-PIMS	Plan #1	Plan #2	Plan #3	Plan #4
Equities	60%	52%	45%	41%	56%
Fixed Income	40%	22%	30%	41%	41%
Real Estate	--	18%	17%	8%	--
Private Equity	--	--	--	--	--
Hedge Funds	--	--	--	--	--
Other	--	8%	8%	10%	3%
Total	100%	100%	100%	100%	100%
Estimated 20-Year Geometric (i.e. compounded) Average Annual Portfolio Return	6.96%	7.76%	7.41%	6.98%	6.96%
Assumptions:					
Equities – U.S. Large Cap					
Fixed Income – LT Govt/Credit					
Real Estate – 50% REIT/ 50% direct investment					
Other – Hedge fund of funds assumed but could include a variety of alternative assets					

As noted in the Known Issues Under Review for Future Maintenance /Development, the PBGC has access to plan-specific asset allocation data and that data has been loaded into ME-PIMS. At a minimum, we believe that the 60% Equity / 40% Fixed Income allocation needs to be revised to reflect a more typical ME pension plan asset allocation. Better yet, ME-PIMS should reflect plan specific asset allocations (albeit somewhat out of date due to changes during the run-up period in ME-PIMS).

As previously noted, whether this issue is a Category 1 or Category 2 item will depend in part on implementation issues.

iii. Non-Calendar Year Plans

In the course of our review, we discovered some abnormalities in the projections of one or two plans – we were informed that, due to an oversight, the non-calendar-year plans were not updated with new data and that the projection results for such plans might be unreliable. Our review of one or two such plans bore that out – results for at least one plan did not appear consistent with the type of results for similarly situated calendar year plans. We note that one of these plans is a very large plan.

iv. The Use of ME-PIMS

In evaluating the use of the PIMS system we focused on a few primary areas, specifically:

- a. System documentation
- b. Ability to make programming changes
- c. System structure/organization
- d. Output

a. System Documentation

During the course of our review of the ME-PIMS system, it was of course necessary for Buck to become very familiar with the use of the system and its functionality, which included reading and using the system documentation. The documentation is spread over quite a number of separate files and we believe the overall organization needs to be explained to the user prior to actually using the materials. Also, partly because the documentation is so widespread, the time required to get even a basic understanding of the system is somewhat daunting. Better organization, perhaps more of a user hierarchy and perhaps a master index of materials would help considerably. Once pointed in the right direction however, we found the documentation reasonably easy to understand and generally very extensive.

The documentation contains very little in the way of detailed examples, which we think would help considerably in our understanding of the methodologies employed. Also, critical details were in many cases not included or were somewhat vague. Examples of this would include (i) details regarding how new amortization bases are set up each year, (ii) details about how the contributions are developed, (iii) details on withdrawal liability payment assumptions, and (iv) mortality and other decrement assumptions in the valuation of the liabilities.

One area that had fairly sparse documentation and difficulty in actually attaining information at all is with respect to outputting of detailed interim calculation figures on both an overall summary level and on an individual plan level. As a result, an audit of the results is very time consuming, cumbersome and, in some instances, not practicable – even, it would appear, for internal personnel who regularly use the system. Beyond the documentation issue, we have additional comment below on the relative ease of checking results.

b. Ability to make programming changes

One fairly common theme in the answers to our questions about the system was that it seemed to be difficult and time consuming to make any changes to the programming – even changes that on the surface, at least, seem simple. It is not clear if this is due to system complexity or availability of programming resources. For example, when questioned on why 2007 actual contributions were used as the basis of projection when the 2009 actual contributions were available, we were told it would be a big job to make such a change.

c. System structure/organization

In general ME-PIMS has the feel of a system that was cobbled together over time through various “bolt-ons” and modifications to the SE-PIMS system. As a result there seems to be obsolete data fields (e.g. legacy SE-PIMS data) and multiple layers of programming spread over several discreet jobs and systems. At some point this fragmented and disjointed structure can become unmanageable, difficult to follow and increasingly prone to errors.

d. Output

The assembling and interpreting the ME-PIMS output was analogous to assembling a jigsaw puzzle. First one has to collect all of the correct pieces of information (i.e. the ME-PIMS specific pieces) and then one had to assemble them in a way that allowed the user to attempt to follow the calculation logic. We realized that given the complexity of the task at hand there is a need for numerous data table containing input and output fields. Our system and others

that we are familiar with have some of the same characteristics. What would have been helpful would have been having a file that assembled all of the key valuation input components on an annual basis and then traced the key valuation calculations. This trace file would include for both the roll up period and the projection period:

- Show the ME-PIMS result and the Schedule MB results to confirm adequate calibration
- Year-over -year liability with gain/loss analysis
- Asset reconciliations with gain/loss analysis and portfolio returns
- Amortizations schedules
- Development of contributions (minimum required funding, negotiated, FIPs, RPs, shown separately)
- Funding standard account balance
- PPA Zone determination
- Summary plan demographics that are the basis for the liabilities

It would also be useful to have benefit and liability traces for a given cell in the age/service matrix.

v. **Liability Calculation Issues**

Our comments on the liability calculation pertain primarily to the treatment of ancillary benefits and the calibration of the liabilities.

Valuation of Ancillary Benefits

As a general rule we are proponents of the practice of explicitly valuing all liabilities to the greatest extent possible and would suggest that the PBGC value ancillary benefits unless it increases runtime to untenable levels. It appears to us that ME-PIMS already calculates the decrements, but just does not apply them to the ancillary benefits. Since the calculation is substantially underway, we would ask how much additional runtime would result.

Liability Calibration

The liabilities in ME-PIMS are initially calculated and then calibrated, which is a common step in modeling, and especially necessary with ME-PIMS since the input data available is sparse. The current procedure of calibrating the liabilities, however, could be improved to provide more accurate results.

Reviewing this for select plans, the ME-PIMS RPA '94 current liability does correspond to the amounts reported on the Schedule MB. However, the actuarial accrued liability (AAL) and the accrued liability normal cost (NC), however, do not match the reported amounts on the Schedule MB.

Our understanding of the calibration is that ME-PIMS calibrates to the RPA '94 current liability due to the fact that the liabilities are reported separately for retired participants and beneficiaries receiving payment, terminated vested participants, and active participants. Once the initial liability calculation is complete, the first calibration step is to adjust the benefit

amount, with an adjustment subject to a maximum (e.g. 2.5%). If this calibration is insufficient, the plan population is shifted until the ME-PIMS calculated and calibrated liability matches the RPA '94 current liability for each group. This calibration is then used for the actuarial accrued liability (AAL) and the accrued liability normal cost (NC).

Several issues arise with this calibration methodology.

- 1) Calibrating to the RPA '94 current liability does not ensure calibration to either the AAL or the NC. Several plans reviewed showed the calibration led to a higher AAL than reported on the Schedule MB. This may create a bias for higher contributions during the run-up years, which ultimately could lead to an overstatement of the funded status at time 0. While the RPA '94 current liability may provide a basis to calibrate the plan liability for the various participant statuses, the AAL and NC cost should also be calibrated to and match the reported Schedule MB amounts. One possible solution, while still being an estimate and would require calibration, follows below.
 - i. Use the RPA '94 current liability to estimate the percentage of the liability for each status type.
 - ii. These percentages could then be used to estimate the proportion of the liability for each status in the AAL. In the case of plans not using unit credit, the inactive liability could be estimated from Schedule MB line 1c(3), which is a unit credit measure, and then netted out from the AL shown on Schedule MB line 1c(1), leaving the active liability for calibration under the chosen actuarial cost method. The inactive liability under any cost method will not change and can also be calibrated.
- 2) ME-PIMS currently values only retirement benefits in the determination of the liability. Ignoring benefits before retirement may greatly affect the level of calibration needed to match reported Schedule MB values, AAL and NC, and affect the accuracy of a plan's benefit cash flows. Younger participants with lower service amounts show the largest discrepancy. A population with a heavier weighting of these participants, would be more likely to induce the population shift calibration measure, since the liability, normal cost, and the expected benefit payments for the participants will be understated. In fact, these participants will have no benefit payments until retirement eligibility is reached. Additionally, ME-PIMS allows these participants to leave under the other non-valued decrements on the way to reaching retirement eligibility. In doing this, the system is building in liability gains each year. For example, if the only pre-retirement decrement is withdrawal, a percentage of the individual is assumed to decrement each year. When moving population forward, this percentage of the individual leaving the plan does not receive a deferred benefit and also lowers the proportion of the individual remaining by the time retirement eligibility is reached, lowering that portion of the liability. Presumably, this proportion is replaced by new entrants beginning with a zero liability.
- 3) Since much of the liability for the entire system is contained in several large plans, the steps described in (1), if possible, should be modified. Given the importance of these plans and the importance of the AAL and NC, more recent information should be requested during the run-up period for the liabilities, such as the actual split for the AAL among the different participant statuses.

Category 3 – Commentary/Recommended Changes:

i. PBGC Financial Assistance Liability Discount Treasury Curve

To the extent that the PBGC ME plan liability is valued on the basis of yields on fixed income securities, we believe that given the variety of ways that exist to approximately model full yield curve that liability discounting should employ full yield curves rather than a single rate. Further we believe that the best models have full consistency between the yield curve(s) used to discount liabilities and the rest of the capital markets model. A dynamic yield curve model should be used, and portfolio returns should reflect the yield curve dynamics on a scenario by scenario basis as appropriate.

ii. Administrative Expenses Assumption

For reasons that are not clear, plan expenses are assumed to be 5% of the benefit payments each year, and actual information on current plan expenses is ignored. In general, we think that the 5% of benefits rule is probably understating expenses and we think there are better methods. While we don't necessarily expect that this will have a large impact on the results, we would suggest projecting from current expenses and perhaps gradually blending into a modeled expense, but one that is perhaps a function of participant count rather than benefit dollars – which in our experience is much closer to how such expenses are actually generated. Based on informal studies we have done, something around \$100 to \$200 per participant per year, plus PBGC premiums, would be in the right ballpark.

iii. Correctness of Funding Standard Account Calculations

On the inputs and run-up years, we noted inconsistencies in that the beginning of year funding standard account balance did match the 5500 (after rounding), but that the end of year balance did not. Part of the reason was the automatic five year amortization extensions in certain cases and the PPA-2010 amortization and asset smoothing relief. However, part of the reason for the difference was due to various differences within the funding standard account reconciliation such as the assumption regarding the timing of and the actual employer contribution, the normal cost, amortization charges and expenses, and the change in AAL from the valuation figures, as well as a sundry item. Further details can be found in Appendix A.

PBGC's External Reporting – FY 2011 Draft Report – Commentary/Recommended Changes:

We reviewed the latest draft FY 2011 report which was available as of the end of June, 2012 and had the following comments:

- i. The projected net position of PBGC in the report (going out as far as the year 2031) is shown as the present value of the actual position at such point (for example, in 2031) discounted back to 2011. It is not clear from the presentation that this is a present value figure (as of 2011), and we think that the natural reading of the text would suggest a non-discounted figure at each point in time. While there is an overall note in the appendix stating that all values are present values (discounted back to 2011), we think it would be best to clarify this important number in the main text – and perhaps even to show the non-discounted value as of each point in time (only discounted back to that point in time – not discounted back to 2011).
- ii. There is no detailed discussion in the report of when claims are booked and what the “claim amount” means – that is, the 10 year / 20 year rules for ongoing / terminated plans and that the claim amount means the total present value of assistance forever for plans that are booked.
- iii. There is an indication in the footnotes that, in addition to information from the 5500 filings, that more recent information about critical/endangered status and rehabilitation / funding improvement plans and other additional reported information was incorporated into the system. While we believe that such information may well be appropriate (particularly for some of the larger plans), our understanding is that only one plan was specifically adjusted for such information in 2011.
- iv. The benefit improvements footnote should clarify that such increases are not applicable when the plans are projected to be endangered / critical and how that ties in with the assumption that every plan that ever goes into endangered/critical status is assumed to elect the five-year amortization extension under Section 431(d) (as the restrictions under Section 431(d) on benefit improvements are in effect for as long as such amortization extensions are in effect), and ensure that ME-PIMS programming is adjusting appropriately for these constraints.
- v. As noted earlier, while ME-PIMS appropriately assumes COLA increases in PBGC premiums indefinitely into the future, it does not assume any increase in maximum guaranteed benefits – while this clearly has a rationale, it might be worth pointing out the potential discrepancy in the report and perhaps showing the impact of one or two ad-hoc increases in the future.