Date: May 10, 2013

To: PacifiCorp

From: 2012 Wind Integration Study Technical Review Committee (TRC)

Subject: PacifiCorp 2012 Wind Integration Study Technical Memo

Background

The purpose of the PacifiCorp 2012 wind integration study as defined by PacifiCorp in the draft final report is as follows:

The purpose of this study is to estimate the operating reserves required to maintain PacifiCorp's system reliability and comply with North American Electric Corporation (NERC) regional reliability standards. The Company must provide sufficient operating reserves to allow the Balancing Authority to meet NERC's control performance criteria (See BAL-007-1[1]) at all times, incremental to contingency reserves which the Company maintains to comply with NERC Standard BAL-002-0[2]. These incremental operating reserves are necessary to maintain area control error[3] within required parameters, apart from disturbance events that are addressed through contingency reserves, due to sources outside direct operator control including intra-hour changes in load demand and wind generation. The study results in an estimate of operating reserve volume and estimated cost of these operating reserves required to manage load and wind generation variation in PacifiCorp's Balancing Authority Areas (BAAs).

PacifiCorp currently serves 1.8 million customers across 136,000 square miles in six western states. According to a company fact sheet available at http://www.pacificorp.com/content/dam/pacificorp/doc/About_Us/Company_Overview/PC_FACTSHEET_2013_Fweb.pdf, PacifiCorp's generating plants have a net capacity of 10,579 MW, including about

[1] NERC Standard BAL-007-1:http://www.nerc.com/docs/standards/sar/BAL-007-011_clean_last_posting_30-day_Pre-ballot_06Feb07.pdf.
[2] NERC Standard BAL-002-0: http://www.nerc.com/files/BAL-002-0.pdf
[3] "Area Control Error" is defined in the NERC glossary here: http://www.nerc.com/files/Glossary_12Feb08.pdf

1,400 MW of owned and contracted wind capacity, which provides approximately 8% of PacifiCorp's annual energy. PacifiCorp operates two BAAs in WECC, referenced as PACE (PacifiCorp East) and PACW (PacifiCorp West). The BAAs are interconnected by a limited amount of transmission, and the two BAAs are operated independently at the present time, so wind generation in each BAA is balanced independently. PacifiCorp has experienced continued wind growth in each BAA, and has been requested to update its wind integration study as part of its IRP. The total amount of wind capacity in PacifiCorp's BAAs, which was included in the 2012 wind integration study, was 2135 MW.

TRC Process

The Utility Variable-Generation Integration Group (UVIG) has encouraged the formation of a Technical Review Committee (TRC) to offer constructive input and feedback on wind integration studies conducted by industry partners for over 10 years. The TRC is generally formed from a group of people who have some knowledge and expertise in these types of studies, can bring insights gained in previous work, have an interest in seeing the studies conducted using the best available data and methods, and who will stay actively engaged throughout the process. Over time, the UVIG has developed a set of principles which is used to guide the work of the TRC. A modified version of these principles was used in the conduct of this study, and is included as an attachment to this memo. The composition of the TRC for the PacifiCorp study was as follows:

- Andrea Coon - Director, Western Renewable Energy Generation Information System (WREGIS) for the Western Electricity Coordinating Council (WECC)
- Randall Falkenberg – President, RFI Consulting, Inc.
- Matt Hunsaker - Manager, Renewable Integration for the Western Electricity Coordinating Council (WECC)
- Michael Milligan - Lead research for the Transmission and Grid Integration Team at the National Renewable Energy Laboratory (NREL)
- J. Charles Smith - Executive Director, Utility Variable-Generation Integration Group (UVIG)
- Robert Zavadil - Executive Vice President of Power Systems Consulting, EnerNex

The TRC met in person for a kick-off meeting in early 2012, and met by teleconference on 6 occasions throughout the course of the study, which was conducted during the period of January 2012 - March 2013. PacifiCorp provided presentations on the status and results of the work on the teleconferences and engaged with the TRC in a robust discussion throughout the work. The teleconferences were generally followed up with further clarifications and responses to requests for additional information.

Introduction

The Company should be acknowledged for the improvements it made in development of the 2012 wind integration study modeling and for engaging a Technical Review Committee with nationally recognized experts, participants with experience in WECC, as well as in the Company's regulatory arena. The 2012 wind integration study has been positively received by stakeholders participating in the IRP process. PacifiCorp eliminated some of the more controversial and problematical aspects of the 2010 wind integration study, specifically the use of "synthetic data" and "must run" modeling of thermal units in the production cost study. It performed analyses which sufficiently addressed the "load net wind" issue as well, and conducted a number of useful sensitivity studies addressing improved PACE-PACW integration, a 30 minute balancing market and provided the TRC with various tolerance scenarios. Further, PacifiCorp eventually identified and corrected errors in the final workpapers and took steps to analyze and improve the underlying data quality. The company has provided a massive set of workpapers available for later review. The 2012 wind integration study report thoroughly documents the company's analysis.

As mentioned in the report, there is a significant difference in the integration costs between the 2010 study and the 2012 study. The 2012 value of $1.89/MWh of wind generation is on the low end compared to other North American wind integration studies, while the 2010 value of $9.70/MWh is on the upper end of the same studies. Much of this difference is attributed to the reduced gas price used in the 2012 study, $4/MMBtu vs $8 in the 2010 study. However, there were a number of other important changes in the production cost models used by PacifiCorp in the two studies, notably elimination of the assumption from the 2010 study that wind integration resulted in an increase in must run requirements, which was a controversial issue at the time.

Analytical Methodology

The approach for assessing the integration of variable generation into the bulk power system has evolved considerably since the first studies about a decade ago. This trajectory of approximately 40 individual studies in North America has been characterized by a steady improvement in data, tools, and overall methodology, while better capturing the important characteristics and operating nuances of the system being studied. The following section is focused on the methodology used in the 2012 study and will identify the innovations made by PacifiCorp along with some criticisms based on the existing body of wind integration study experience.

The general approach is to simulate the operational planning, scheduling, and real-time operation of the bulk power system chronologically over an extended period of time, usually a year or more at hourly time steps. Various chronological production costing programs have been adapted to provide the framework for these simulations. In nearly every study, however, the limitations of these tools, along with the input data with which to drive them, have been clearly recognized, requiring that work-arounds be developed. These limitations are not surprising given that the production simulation tools were not developed to provide a high-fidelity mimic of power system scheduling and operations.

A major innovation in the 2012 study was the use of actual historical production data for the wind generation fleet. PacifiCorp currently manages over 2100 MW of wind generation, and has high resolution archival data for each plant in the fleet. Almost every previous study has had to rely on synthesized wind production data of some sort, and while this data was of the highest fidelity possible (e.g. NREL mesoscale simulation data), there were limitations in resolution(10 minute time steps, aggregation of 10 to 20 turbines in each grid cell, etc.) and validation against actual operating plant. Because it was the best available, the synthesized data was generally assumed to be the best reflection of reality, although questions were raised along the way which could not be answered definitively. PacifiCorp's use of real data (bad data fixes aside) precludes such questions and uncertainty.

Other critical data for the study was extracted from historical archives. This included load data at high resolution along with various forecasts for both load and wind generation. As a whole, the baseline data set used for this study was of higher fidelity than that used for any previous PacifiCorp study to date.

Comprehensive analysis of this high quality data formed the basis for methods to estimate impacts of variable generation on various operating reserves. The mathematical formulations developed to quantify regulation and ramping reserve requirements mapped reasonably well to the current state of the art. However, by using 10-minute intervals as the basis for these formulations, PacifiCorp did miss an opportunity to clear up some remaining questions regarding aggregate wind and load variability at higher temporal resolution that would be directly used in the computation of area control area (ACE) by the Energy Management System (EMS). This likely has no impact on the study results, but may have limited the insights available from the study, and would have been helpful for the industry as a whole. Combined with knowledge regarding PacifiCorp's participation in the BAAL/RBC field trials, this high resolution data would have potentially provided insights on the impact of BAAL/RBC on the needs for AGC, which would then have an impact on the regulation results from the study.

The application of the short-term load and wind variability, along with short-term uncertainty, was also consistent with the state-of-the-art for integration studies. A significant missing component was the calibration of the calculation method with current PacifiCorp operating practice. Since the study focused on the current situation (i.e. not some future scenario), some attempt to validate the calculations with PacifiCorp operator practice would have substantially increased the validity of the findings. In a sense, this could be characterized as developing mathematical formulations for operator heuristics. As the study was structured, this could have been an innovative and valuable contribution, rather than a missed opportunity.

Another comment concerns the use of the operating reserve estimates in the production simulations. As mentioned earlier, most of the production simulation tools were not designed to mimic power system operations in a level of detail consistent with the different types of reserve categories developed by PacifiCorp. However, some programs do allow for some higher fidelity in this aspect, and the tool employed by PacifiCorp, PaR (Planning and Risk) appears to be one of those. At hourly time steps, the operating reserve requirements are modeled as constraints on the unit commitment and economic dispatch. Table 14 in the report describes the operating reserve categories available in the PaR model, and reveals that this model has more flexibility for applying reserve constraints than many of the other tools used for this type of analysis. Unfortunately, PacifiCorp's use of PaR reserve categories did not exploit this flexibility.

The consequence of this modeling choice was that the intra-hour regulation and ramping reserves had to be combined outside of the program, and while the approach taken by PacifiCorp to mathematically combine these requirements was reasonable, much discussion and many questions were raised at TRC and stakeholder meetings. Effective use of the features offered by PaR would have increased confidence in the study results and provided for a better simulation of actual system operations.

Following are some additional detailed points which should be noted:

Use of Average vs. Chronological Hourly Reserve Constraints: Recent integration studies have recognized that incremental operating reserves for managing the additional variability and short-term uncertainty due to renewables have time- and situation-dependent properties. The best example actually comes from solar PV, where it is obvious to anyone that such incremental reserves would not be needed at night. Wind is the same general case, and the statistics generated by PacifiCorp in their analysis bears this out. At low levels of wind production, the additional variability is small because

aggregate production is small. When the aggregate wind fleet is producing near nameplate capacity, winds are high over a large area and most turbines are actually operating at wind speeds well above rated. This tends to smooth the aggregate output significantly, leading to a lower incremental reserve requirement.

Since the objective of the production modeling was to quantify the cost of the incremental reserves, the use of a monthly average incremental reserve constraint in the model is potentially misleading, especially when the hourly chronological value was already calculated in the study. This is due to the fact that the cost "function" being exercised here (empirically, through comparison of two annual production simulations) is very complicated and non-linear. While wind can effectively free up conventional capacity to provide the needed additional reserve, renewable forecast errors (both day-ahead and hours ahead) can lead to shortages due to de-commitment. Other factors, such as the availability of quick-start resources, also come into play. In some earlier studies, the differential production cost was analyzed on a daily basis, and found to be very "lumpy"; i.e. on many days, the cost of the incremental reserve was very small, but on others, where the factors mentioned above combined unfavorably, the cost was quite high. It is unreasonable to expect that a differential production cost value using an average incremental reserve each hour would accumulate over the year to the same value as one derived from a highly variable hourly profile.

Treatment of Ramping Reserve: The ramping reserve estimated by PacifiCorp through statistical and mathematical analysis was lumped in with total regulation and spinning contingency reserve in the production simulations. Spinning reserve is the most expensive category of operating reserve (with its subset, Regulation, being the most expensive of all). From an operational perspective, a certain portion of the ramping reserve each hour could actually be represented as a requirement for non-spinning reserve, since significant and persistent changes in aggregate wind generation play out over time periods long enough for operators to take action - i.e. deploy quick-start generation, as was done in the EWITS study.

Double-Counting of Reserve Costs: As mentioned previously, the production simulation programs used for wind integration analysis were actually not designed for such a purpose, which puts the onus on the user to insure that the modeling is proper, and also to recognize the limitations of the program.

The reserve requirements for a given operating hour, as described in the PacifiCorp report, are estimated on the basis of information available some time previous to that hour. Because the forecast

technique used for aggregate wind generation is based on persistence, and change in wind generation from that value in the next hour will either consume some of the delegated operating reserve (if wind production decreases) or effectively add to the amount available to meet that constraint (if wind generation is more than anticipated and other operating units are backed down). In the first case, assuming average hourly values of load and generation, deploying reserves set aside previously to compensate for reductions in wind generation would actually, as far as the production simulation program knows, reduce the amount of reserves that needed to be held. This has been considered in previous studies by actually reducing the appropriate portion of the hourly reserve constraint a priori, since wind generation changes are known before the production simulation is run. Reducing the reserve constraint will only reduce production costs, and avoids what has been previously termed a "double-counting" of certain reserves costs associated with managing wind generation.

One additional methodology development was identified as follows. The ramping component in the 2012 wind integration study is a new addition for PacifiCorp. This is an important element of integration cost when applied to the System Optimizer Model (used for the IRP), which does not model reserve allocations or unit schedules in a detailed manner. While the ramping component should not be ignored in the wind integration cost study, as it does contribute a small increment to the required reserves, it is important that it also be considered in the $/MWh total wind integration cost input to the System Optimizer Model. Its applicability in other settings and other types of models has not been established or discussed by PacifiCorp in the 2012 wind integration study, nor has the TRC reviewed this matter.

Assumptions

Results, as in any study, are sensitive to assumptions and inputs. PacifiCorp has done a good job scrubbing and analyzing input data, and much of the analysis appears to be well done. On page 12 there is discussion regarding the percentage exceedence that is used for the reserve calculation. In a footnote, PacifiCorp says that they have not been operating to CPS2 since March 2010 because it is participating in the Balancing Area ACE Limit (BAAL or RBC, Reliability Based Control) field trial. While they insist that the reserve exceedence should be 99.7%, their effective CPS2 performance during RBC is probably closer to 65-70%. Additionally, there is no discussion that links the 99.7% level to CPS2 performance prior to the BAAL field trials. That type of discussion could help build a case for the exceedence level PacifiCorp has chosen, and yet no evidence is offered that 99.7% is appropriate. The report claims that operators will always have sufficient reserves, and that 99.7% (with the L10 adjustment) represents a reduction in performance. That would seem to imply 100% CPS2 performance. Instead, PacifiCorp claims that since

they don't know when they will be on the "right" side of frequency with BAAL, they must plan to run so that they are compliant with existing CPS2 rules. In fact, there appears to be evidence that their CPS2 performance under the BAAL trial is much less, leading to a reserve requirement and a wind integration cost that are too high. Although PacifiCorp stated that they don't know when they would need to provide for increasing or decreasing generation to help frequency under BAAL, characterization of actual behavior and CPS2 performance under BAAL is appropriate. It is never known in what minute AGC/regulation will move up or down, yet statistical characterization that matches CPS2 performance is a common method.

PacifiCorp has not persuasively justified the 99.7-L_{10} tolerance level. The entire analysis consisting of millions of calculations and hundreds of megabytes of spreadsheets rests upon this one assumption. Deciding this single input strongly influences the final answer. There is no path from the actual reliability requirements to the input assumption used, nor is there even an intuitive guideline. In this respect, the 2010 wind integration study was superior because the tolerance target used was loosely driven by CPS2. Concurrent studies performed by other entities in the region were cited as some justification, but this is simply not persuasive, as some of the same entities were using different numbers in the past.

Further, owing to the bin structure in the PacifiCorp model, it is unlikely that setting the input to a 99.7 tolerance level will actually result in the corresponding level of reliability. The 20 bin structure used to model the "following" reserve components results in development of about 36 monthly "error" observations in each of the 20 bins. Excel is used to find the 99.7th percentile errors for each bin (for each month). At best, this allows one to find a 1 in 36 error (more likely a 97% tolerance) not a 1 in 600 error (which is required for achieving a 99.7% tolerance). The results of the 20 monthly 99.7th percentile bin errors were then averaged. The averaging of reserves likely has a significant impact on the implicit CPS score that is inherent in the modeling because the number of times L10 is exceeded will be very different with an average reserve level. In the end, there is little correlation between the tolerance level assumption and the actual number of reserve shortages that might occur were these results actually applied. For planning applications where the difference between scenarios (using the same underlying reserve levels) is compared, this may not be very significant. However, this is not the case for applications where the overall level of reserves is important. Certainly, this study should not be used a guide for operational purposes, and we understand this is not the intention.

Results

There is considerable discussion showing the extensive calculations to determine the chronological reserve requirements for wind energy. This discussion and the method used to calculate these reserves appear to be reasonable. On the last TRC call, we discovered (to our surprise) that the simulations used only the monthly average reserve, not the chronological reserve that so much effort went into calculating. However, on page 39, the use of the average reserve is not mentioned. On page 47, the report states *The PaR model distinguishes reserve types by the priority order for unit commitment scheduling, and optimizes them to minimize cost in response to demand changes and the quantity of reserve required on an hour-to-hour basis.* Based on what we heard on the TRC call relative to the use of the average reserve, this statement is misleading. The report does not mention that the chronological reserves are not used in the simulations. There are two issues here: (1) the report should make prominent mention of this and (2) the results of the study are rendered less accurate by this approach. It is not obvious whether the results for reserves and integration cost would be too high, or too low, given the many non-linearities in the modeling. It depends on system marginal cost relative to the reserve carried, i.e. when reserve is higher or lower than average.

Discussion and Conclusions

Overall there are a number of quite positive aspects about this study. PacifiCorp has generally been responsive to TRC questions and requests. The study is much improved compared to the prior one that was completed a few years ago. The general approach for calculating wind-induced reserve appears reasonable. However, the results depend on the adoptions of the relatively arbitrary 99.7% exceedence level, and the use of an average monthly reserve level instead of the hourly reserve levels calculated. The 99.7% exceedence level does not reflect the way the system is currently being operated or will likely be operated in the future, and likely increases reserves and costs, while the effect of the use of the average monthly reserve is uncertain.

Regulators should be aware that the modeling contains various resources that may or not be reflected in regulated rates and contains loads from the entire PACE and PACW control areas, not simply PacifiCorp's native customers. For example, the Oregon PUC denied cost recovery of one of the company's wind plants in a prior case, while other states have denied recovery of integration costs related to certain non-owned wind plants that are transmission service customers. The TRC should not be viewed as endorsing this aspect of the study for any purposes beyond the intended planning applications, and does not believe that its involvement with PacifiCorp is a substitute for the normal regulatory process.

In summary, during the past 12 months, we have attended a number of meetings of the Technical Review Committee, one in person and six via telephone. The goal of this Committee was to engage with PacifiCorp in determining a reasonable methodology for estimating wind integration costs for the PacifiCorp system. We have actively participated in these meetings, as well as engaged in extensive discussion with PacifiCorp staff via telephone about the study and the data presented. We have also examined the data and analysis provided by PacifiCorp as part of this study. PacifiCorp has generally been cooperative and forthcoming in answering questions and providing data requested by the TRC. While we do not agree with all of the decisions that were made by PacifiCorp for the reasons stated, it is our opinion that while the proposed methodology is not perfect, it is adequate for the intended purpose and produced a reasonable result. We believe the 2012 wind integration study merits a qualified endorsement by the TRC. With additional time and money, a better result could be achieved.

Recommendations for Future Work

Wind Integration modeling is continuing to develop and more useful data is becoming available. There are various matters that should be improved upon in future work.

- Reserve requirements should be modeled on an hourly rather than a monthly average basis in the production cost models.
- PacifiCorp has not been operating to CPS2 since March 2010. Their effective CPS2 performance during the RBC field trial is probably closer to 65-70% than 99.7%. The 99.7% exceedence level should be studied parametrically in future work, or a better method to create a path between the actual reliability requirements and the tolerance level driving reserve requirements should be developed.
- The distinction between three different types of reserve requirements ("regulating", "following" and "ramping") is blurred under the heading of "regulating margins" using the root-sum-square (RSS) formula. Regulating margin implies reserve capacity available on very short notice (ten minute or less). Such responsiveness is not necessarily required for all three types of reserves modeled. The ramping and following categories certainly do not all require such immediate availability. Future work should treat these categories differently by making better use of the capabilities already in PaR and comparing the results to use of the RSS formula.
- Given the vast amount of data used, and the dozens of very large spreadsheets employed, just correcting an error or changing a tolerance level was very time consuming for the

company. Spreadsheets may not be the best tool for this sort of analysis. Rather a dedicated, but flexible computer program incorporating advanced statistical packages to facilitate better statistical analysis, or better use of existing programs like PaR, should be considered. At least one member of the TRC who performs analysis with Gretl suggests that a simpler, more transparent analysis could be performed using a flexible statistics package.

- While part of the reason behind the large shift in integration cost calculations is described in the report (lower forecasted natural gas and power market prices), it would be interesting to see how the integration costs calculations would compare using the same gas and power market prices used in the 2010 study. In addition, a sensitivity analysis with carbon tax assumptions would also provide some useful results.
- The PACE-PACW integration analysis is useful, and should be expanded to consider the benefits obtainable from the current system, as some reserves are transferrable between BAAs already, though integration is far from complete. Further to this point, PacifiCorp and CAISO recently announce the creation of a two-party energy imbalance market (EIM). This announcement came after the current study draft was completed. While it is not reasonable to expect that the study should be re-done, it should be noted that based on the analysis performed for the EIM to date, as well as on the sensitivity studies done during the course of the project, it would be reasonable to conclude that the EIM would decrease reserve and integration cost. The most recent results for the cost of carrying reserves due to wind integration in the ERCOT five-minute energy market (10 GW wind capacity in a 65 GW peak load system) , as presented at the 2013 UVIG Variable Generation Forecasting Workshop in Salt Lake City in February, and the UVIG Spring Workshop in Charleston in April, was about $.50/MWh.

Concurrence:

Andrea Coon – Director of WREGIS, WECC

Randall Falkenberg – President, RFI Consulting, Inc.

Matt Hunsaker - Manager, Renewable Integration, WECC

Michael Milligan - Lead researcher, Transmission and Grid Integration Team, NREL

J. Charles Smith - Executive Director, UVIG

Robert Zavadil - Executive Vice President, EnerNex

Principles for Technical Review Committee (TRC) Involvement in Studies of Wind Integration

A properly constituted TRC will assist the project sponsors in ensuring that the quality of the technical work and the accuracy of results will be as high as possible. TRC participation will also enhance the credibility and acceptance of the study results throughout the affected stakeholder communities. TRC members will be qualified to carry the key messages of the study to their respective sectors. Endorsement by the TRC is not intended to replace regulatory review and approval.

TRC Membership

TRC membership should include individuals that collectively provide expertise in all of the technical disciplines relevant to the study. A TRC facilitator should be selected from among the TRC members. Sponsorship and facilitation of the TRC should be independent from, but closely coordinated with, the project sponsors and the team conducting the work.

Functions and Requirements of TRC Members

The TRC will

1. Review study objectives and approach, and offer suggestions when appropriate to strengthen the study.
2. Help ensure that the study:
    a. Builds upon prior peer-reviewed wind integration studies and related technical work;
    b. Receives the benefit of findings from recent and current wind integration study work;
    c. Incorporates broadly supported best practices for wind integration studies;
    d. Is accurately portrayed to broader stakeholder groups.
3. Engage actively in the project throughout its duration. In general, project review meetings should be held nominally on a quarterly basis; some meetings can be held telephonically, but some should also occur face to face. A face to face kickoff meting to establish and agree on the general direction of the work is preferred, but not required.
4. Engender a discussion of methods and results among TRC members, the study team, project sponsors and other interested parties. The aim of these discussions is to improve accuracy, clarity and understanding of the work, and reach consensus resolution on issues that arise.
5. Avoid public disclosure of meeting discussions and preliminary results. In general, findings should not be released until accepted and generally agreed upon by project sponsors, the study team and the TRC. When advisable, possible, and agreed to by all project participants, interim progress reports can be provided to a broader stakeholder group.
6. Ensure that findings are based entirely on facts and accurate engineering and science. Project sponsors need to embrace this aim so that the results and findings are objectively developed and not skewed to support any desired outcome.
7. Document results of TRC meetings and distribute meeting presentation and minutes.

TRC requirements

To carry out these functions the TRC requires:

1. Access to all relevant information needed to properly evaluate the work and the results. When required, TRC members will enter into confidentiality agreements to protect this information. If specific information is determined to be needed by the TRC, it cannot be declared "off limits."
2. Assurance that the study results will be made public through published documentation or other suitable means, with the understanding that business-sensitive information will be maintained as confidential and not be made public.
3. Assurance that project sponsors will describe the project as having the benefit of expert review by the TRC only if the TRC has clearly expressed its acceptance of and agreement with the results or methodology of the study. To the extent the TRC has only clearly expressed its acceptance of and agreement with specific aspects of the study, the project sponsors will describe that only those aspects of the study as having the benefit of expert review by the TRC.
4. Assurance that, in the event agreement is not reached by the TRC and other project participants, any reference to the TRC will be removed from the final report and any associated documentation or publicity. To the extent that the TRC has only clearly expressed its acceptance of and agreement with specific aspects of the study, any reference to the TRC in connection with those aspects of the study in which the TRC has not expressed agreement will be removed from the final report and any associated documentation or publicity.

If you agree with the above principles please sign below.

For Project Sponsors(s)

For Technical Review Committee

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TRC requirements

To carry out these functions the TRC requires:

1. Access to all relevant information needed to properly evaluate the work and the results. When required, TRC members will enter into confidentiality agreements to protect this information. If specific information is determined to be needed by the TRC, it cannot be declared "off limits."
2. Assurance that the study results will be made public through published documentation or other suitable means, with the understanding that business-sensitive information will be maintained as confidential and not be made public.
3. Assurance that project sponsors will describe the project as having the benefit of expert review by the TRC only if the TRC has clearly expressed its acceptance of and agreement with the results or methodology of the study. To the extent the TRC has only clearly expressed its acceptance of and agreement with specific aspects of the study, the project sponsors will describe that only those aspects of the study as having the benefit of expert review by the TRC.
4. Assurance that, in the event agreement is not reached by the TRC and other project participants, any reference to the TRC will be removed from the final report and any associated documentation or publicity. To the extent that the TRC has only clearly expressed its acceptance of and agreement with specific aspects of the study, any reference to the TRC in connection with those aspects of the study in which the TRC has not expressed agreement will be removed from the final report and any associated documentation or publicity.

If you agree with the above principles please sign below.

For Project Sponsors(s)

For Technical Review Committee