

2017-09-29

D. J. Flintoff,
Richmond, BC


Mr. Patrick Wruck
Commission Secretary and Manager
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British Columbia Utilities Commission
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Dear Mr. Wruck:

RE: British Columbia Utilities Commission (BCUC or Commission)
Inquiry Respecting Site C
Comments on Preliminary Report to Provincial Government and the Public

The Commission invited the public to comment on its preliminary report by way of written submissions.

My submission (the cover letter and attachment) will mainly address whether the project is on time and within budget. Since BC Hydro is not using Earned Value Methodology¹, the Panel does not know the current percent complete of the project or the estimate to complete the project. As a result, the forecast total to complete is not known. Thus, the Panel is unable to ascertain whether the project is on schedule and within budget at completion. Even now, the Panel has not accepted BC Hydro's statement that the project is "on track". Under the current schedule, BC Hydro estimates the cost to complete the project to be \$6.2 billion as of December, 2017. How did BC Hydro calculate this amount?

The Panel should give greater consideration to the BC Hydro's estimate of cost and heed the warnings of Ansar, and Eliesen on the potential of cost over-runs as well as the comments of Deloitte on BC Hydro's low contingency (14%). The Panel should consider whether or not it should use the P90 value (more contingency) from BC Hydro's Monte Carlo analysis (P90) against which all other cost will be evaluated. By using the P90 value, the Panel will have addressed some of Deloitte's, Ansar's and Eliesen's concerns.

The cost estimates to suspend/terminate the project are only Class 5 estimates (Order of Magnitude or -50% to +100%) and will not be discussed further except to note that BC Hydro plans on retaining its project staff for at least two years under one of the scenarios.

¹ https://energy.gov/sites/prod/files/DOE_EVMS_Gold_Card_Sep_2011.pdf

It is unfortunate the game changers, Burrard Thermal and the Columbia River Treaty - Canadian Entitlement, are not allowed in the portfolio of generating projects and demand-side management initiatives to be considered. If the CEA is relaxed, Burrard Thermal could provide natural gas jobs in the North, provides a heat source for a Coquitlam district heating system, provide energy security for the lower mainland (minimum transmission required), and make better use of an existing BC Hydro generating facility.

As for expected peak capacity and energy demand, the planning horizon is too far out to be very accurate. However, we should remember that the last time Site C was cancelled in the November 1983; the lights stayed on. At that time, the BCUC stated the dam was not needed and criticized B.C. Hydro's forecasting ability.

Yours sincerely,

Donald Flintoff

BRITISH COLUMBIA UTILITIES COMMISSION INQUIRY RESPECTING SITE C
PRELIMINARY REPORT TO THE GOVERNMENT OF BRITISH COLUMBIA
SEPTEMBER 20, 2017

D. J. FLINTOFF'S COMMENTS

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A. INTRODUCTION

BCUC invited written submissions on the preliminary report on or before October 11, 2017. My comments will not address all of the Panel's findings but will be mostly confined to those highlighted below.

B. SUMMARY OF PRELIMINARY PANEL FINDINGS (APPENDIX F, A-13)

No.	Finding	Page No.
1.	Based on our review of the information provided, the Panel has identified numerous areas where additional information is required and has therefore requested in this report that BC Hydro provides additional information. We request that BC Hydro respond to the questions in this report, which are summarized in Appendix C, by October 4, 2017.	1
2.	We recommend that BC Hydro, instead of submitting all its responses at the deadline, provide its responses to the Commission as they become available so that the Panel and other parties are able to review the information on a timelier basis.	1
3.	Throughout this Preliminary Report, the Panel has made preliminary findings and seeks additional information. Readers are cautioned that these are preliminary and subject to change as we complete the consultation process and as additional information becomes available	1
4.	<i>The Panel finds that the project is, as of June 30, 2017, on time for a final in-service date of November 2024.</i>	14
5.	The Panel finds that it is not yet in a position to determine whether the project will remain on schedule for completion by November 2024.	19
6.	The Panel finds that it is unable to determine whether the project is currently on budget.	22

No.	Finding	Page No.
7.	The Panel finds that if the river diversion is not achieved in September 2019, the project will not remain within its budget of \$8.335 billion.	32
8.	The Panel finds that it does not have sufficient information to assess the total possible budget overruns once the Site C project is complete.	33
9.	The Panel finds that these results are indicative of BC Hydro's ability to deliver projects on budget on the average, but that they provide little insight into the likelihood that Site C will be delivered on budget, since Site C is so much larger than any other project BC Hydro has managed in its recent history.	34
10.	<i>The Panel gives more weight to the evidence specific to the Site C project than to the conclusions drawn by the Ansar study, which the Panel views as providing guidance on risks rather than specific evidence.</i>	34
11.	The Panel finds that \$1.1 billion is a reasonable estimate of the costs of suspension and maintenance for the project.	38
12.	The Panel finds there is significant variance between the BC Hydro's and Deloitte's estimates with respect to costs related to restarting the project.	38
13.	Given the lack of clarity with respect to some of the costs the Panel finds it premature to reach a conclusion as to the total costs for the project in the event it is suspended and restarted at a later date.	39
14.	The Panel finds it is these differences that account for much of the variance between the BC Hydro estimate and the Deloitte estimate.	39
15.	The Panel finds that both estimates are reasonable, and that an appropriate estimate for termination costs is \$391 million	43
16.	the Panel finds that both estimates are reasonable, and that an appropriate estimate for remediation costs is \$662 million	43
17.	The Panel finds the total cost for termination and remediation to be \$1.1 billion.	43
18.	The Panel finds it is not yet in a position to make its finding on impact of recent developments in the industrial sector due to insufficient information.	56
19.	The Panel finds that the historical instances of over-forecasts are greater than under-forecasts, especially in the industrial load and that the accuracy of BC Hydro's historical industrial forecasts looking out three and six years have been considerably below industry benchmarks. However, the Panel finds that we cannot yet assess the reasonableness of BC Hydro's industrial load forecast due to insufficient information	59

No.	Finding	Page No.
20.	The Panel finds that it is not yet in a position to make its finding on the reasonableness of BC Hydro's inputs for GDP and disposable income due to insufficient information.	61
21.	Therefore, the Panel finds it is not yet in a position to make its finding on the reasonableness of BC Hydro's price elasticity or rate increase assumptions due to insufficient information.	64
22.	The Panel is not yet in a position to make its finding on the potential impacts of disrupting trends due to insufficient information.	66
23.	The Panel adopts the above definitions of firming, shaping, storage and Unit Energy Cost for the purpose of section 3(b)(iv) of the OIC.	76
24.	<p>In Appendix A, the Panel reviews the submissions and makes the following general findings (please see the appendix for further detail):</p> <p>5. Biomass, geothermal, solar and battery storage are potential candidates for alternative generation and should be considered by BC Hydro.</p> <p>Costs modelled by BC Hydro for wind may understate the decrease in capital costs expected over the next 20 years.</p>	76
25.	<p>In these sections we find that the assumptions underlying the derivation of both UECs are not well documented enough to be able to make any finding concerning:</p> <ul style="list-style-type: none"> ☐ The alternative portfolio proposed is indeed the least cost of all possible alternative portfolios; and ☐ The unit energy cost of either Site C or the alternative portfolio. <p>Based on the data and analysis available at this time, the Panel finds that the Site C UEC delivered to the Lower Mainland may be understated and the alternative portfolio UEC delivered to the Lower Mainland may be overstated.</p>	78
26.	The Panel finds that the reduction of the UEC to account for reduced financing costs distorts the analysis of unit energy costs comparisons.	86
27.	The Panel is concerned that if BC Hydro is not applying the same assumed project financing rate to the Alternative Portfolio, the result will not be comparable and furthermore, it assumes that BC Hydro will not be constructing and owning the Alternative Portfolio. This results in an "apples to oranges" comparison. BC Hydro is requested to clarify its financing assumptions.	86
28.	The Panel finds BC Hydro's analysis of the adjusted UEC of the alternative portfolio to be too opaque to be of value in a comparison of costs of Site C to an alternative portfolio and finds the assumptions underlying the UEC to be not well explained.	92
29.	The Panel finds that the usefulness of the UEC is limited as a comparison methodology because it doesn't appear to take into account when the energy source comes on line.	92
30.	The Panel finds the assumptions used by BC Hydro are not as well documented as they need to be to allow us to make any findings regarding the appropriateness and cost of alternative portfolios,	102

No.	Finding	Page No.
31.	The Panel finds that geothermal, biomass, solar and battery storage may be viable alternatives and requests that BC Hydro rerun its portfolio analysis with these alternatives included.	103
32.	The Panel finds that recovery of expenditures over a longer period rather than a shorter period in the event of termination as proposed by BC Hydro is reasonable.	121
33.	The Panel finds that geothermal is potentially a viable alternative and we do not agree with BC Hydro that geothermal should be excluded from consideration as part of its alternative portfolio.	A-10
34.	Based on BC Hydro's submission, the Panel finds that biomass is eligible for inclusion in an alternate portfolio. It is firm, dispatchable and has a relatively low UEC.	A-25
35.	The Panel finds there have been significant declines in the cost of utility scale solar over recent years, and that further declines are expected.	A-27
36.	The Panel finds that while this project may show promise, it is at an early stage of pre-development. Accordingly we are reluctant to draw any conclusions from the material presented by Alaska Hydro.	A-29
37.	The Panel finds the results of the studies cited by the Wind Energy Association, Baker and Deloitte to be reasonable.	A-37

C. BCUC MANDATE

On August 2, 2017, the LGIC issued OIC 244, invoking section 5 of the UCA, and requesting the Commission to “advise the Lieutenant Governor in Council respecting the Site C project in accordance with the terms of reference set out in section 3 of this order. OIC 244 states that the Inquiry is to commence on August 9, 2017, that a Preliminary Report must be submitted by September 20, 2017, and a final report must be submitted by November 1, 2017.

The OIC outlines several issues of cost and schedule to be considered by the Commission.

D. PROJECT BASELINES

1.0 Reference: BC HYDRO'S QUARTERLY PROGRESS REPORT NO. 1

In the Final Investment Decision of December 2014, BC Hydro states that the first generating unit will be in service in on December 2023 and the last generating unit will be in service on November 2024. Further, BC Hydro states that Subsequent to the Final Investment Decision, it has accelerated activities in order to mitigate schedule risk.

The project schedule spans July 2015 to November 2024 or approximately 19 years. The project is in its 2nd year and the project schedule is at 10.5% expended.

1.1 What activities were accelerated and what was the impact to the costs?

E. PROJECT DATA

2.0 Reference: Project Costs

The Project **Budget** is \$8.335 billion including Net Book Value of Impact Benefits Agreements (IBA)-related costs and excluding \$440 million Treasury Board Reserve.

The **Spent** to date is \$1.8 Billion.

The BC Hydro's **Estimate to Complete** the project is \$6.2 billion¹.

Therefore, we are led to believe the **Forecast Total at Completion** is \$8 billion. This is less than the current project budget. BC Hydro should explain how they determined the estimate to complete of the project is \$6.2 billion

In Chapter 6 of BC Hydro's F17 to F19 RRA, p. 60, BC Hydro states "Regulatory applications are produced on the basis of the preliminary designs and the expected estimate accuracy is +15/-10 per cent, nine times out of ten." The +15% would bring the estimate up to \$10.09 billion.

As a Monte Carlo analysis was employed to develop the Project Budget, is the number of \$8.775 billion a P50 amount? If so, the Panel should request the P90 amount.

¹ BCUC Site C Inquiry – Preliminary Report, p. 36 of 121

Table 2 Project Budget

Description	Capital Amount (Nominal \$ million)
Dam, Power Facilities, and Associated Structures	3,559
Offsite Works,	624
Construction Management and Services	757
Total Direct Construction Cost	4,940
Indirect Costs	1,194
Total Construction and Development Cost	6,134
Contingency	794
Interest During Construction	1,407
Expected Project Cost, before Treasury Board Reserve	8,335
Treasury Board Reserve	440
Total Project Cost	8,775

**BC Hydro Submission to the British Columbia Utilities Commission
Inquiry into the Site C Clean Energy Project**

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Using the BCUC's CPCN Guidelines for Monte Carlo analysis, the Panel should request BC Hydro to supply the following information:

- the base estimate
- the P50 expected value estimate
- the P-value including contingency and the dollar value
- the P-value including reserves, if any, and the dollar value
- the P90, the input probability curves
- the relationship between the inputs and the output
- the output histogram and cumulative curves
- tornado graphs

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Table 3 Schedule of Actual Costs Incurred to June 30, 2017, Compared to Budget

Work Activity	Budget	Total Life to Date Actual	
	\$ million	%	\$ million
Dam, Power Facilities and Associated Structures	3,559	16	562
Offsite Works	624	7	46
Construction Management & Services	757	58	442
Subtotal - Direct Construction Costs	4,940	21	1,050
Development and Regulatory Costs	367	100	366
Construction Insurance	46	7	3
Project Management and Engineering	360	49	178
Mitigation and Compensation	421	15	64
Subtotal - Indirect Costs	1,194	51	611
Contingency	794	n/a	n/a
Interest During Construction	1,407	10	139
Expected Project Cost	8,335	22	1,800
Treasury Board Reserve	440	0	0
Total	8,775	21	1,800

7 Dam, Power Facilities and Associated Structures includes Earth fill Dam, Approach Channel and Roller
8 Compacted Concrete Buttress, North Bank Stabilization, Cofferdams, Dykes and Diversion Tunnels, Access
9 Roads, Powerhouse, Spillways, Intakes and Penstocks, Turbines and Generators, Substation and Transmission.
10 Offsite Works includes Highway 29, Clearing, Land and Rights.
11 Construction Management and Services includes Worker Accommodation Construction and Operations as well
12 as overall Construction Management.
13 No actual expenditures are presented for contingency in [Table 3](#). When contingency funds are committed to a
14 particular scope of work the resulting expenditures, when they occur, are presented on the same line as that
15 scope of work.

Assuming the estimate provided by BC Hydro is an estimate Class 3, it could have an accuracy range of -20% to +30%. Using the upper value of the range, Site C could easily become \$11.408 billion and still be within budget. This agrees with Eliesen's (F13-1, p. 11) high probability that the final Site C capital cost will be about \$12 billion. Hence, the Panel may find merit in using the P90 estimate with a larger contingency amount.

3.0 Reference: Use of Contingency

Although BC Hydro has been fortunate with its increase in contingency from \$794 million to \$1.195 million, it has already committed \$356 million. Contingency funds should not be included in the total construction costs to balance out cost overruns but should be used for unforeseen events that could not have been known at the time of the estimate.

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Table 4 Changes in Contingency since Final Investment Decision

Description	\$ million (Nominal)
Original Contingency Budget, at Final Investment Decision	794
Identified Savings on Forecast Interest-During-Construction:	
2015	89
2016	76
2017	150
Total identified Savings on Forecast Interest-During-Construction	315
Other Cost Savings identified, to June 30, 2017	86
Total identified Cost Savings	401
Total Contingency, June 30, 2017²⁴	1,195

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Table 5 Contingency Remaining

	As at June 30, 2017 (\$ million)
Total Contingency Budget	1,195
Less Contingency Committed to June 30, 2017	(356)
Contingency Remaining	839
Project Reserve Held by Treasury Board	440
Total Remaining Contingency, Including Project Reserve Held by Treasury Board	1,279

Deloitte states that it finds the contingency at the low end of the range for a project of the nature and would have expected a higher contingency.

4.0 **Reference: Earned Value Methodology (EVM)**

For several years, BCUC staff through the CPCN Guidelines has been nudging BC Hydro to use EVM tracking and reporting on its projects. However, BC Hydro is not using **Earned Value Methodology (EVM)²**, a recognized standard (ANSI EIA 748-1), for tracking the Site C project. Therefore, there is no way of verifying if the project is on budget and on schedule since the percent complete and estimate to complete percentages are not known. BC Hydro will not commence EVM tracking until December 2017 (the month following the BCUC due date for its report). Further, as the project is in its early stages, any accurate reporting of “on-time” and “on-budget” are suspect.

² https://energy.gov/sites/prod/files/DOE_EVMS_Gold_Card_Sep_2011.pdf

5.0 **Reference: Finding #4
Schedule**

4.	<i>The Panel finds that the project is, as of June 30, 2017, on time for a final in-service date of November 2024.</i>	14
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As this is early days in the project and EVM is not yet in place, the Panel wording should be changed as follows: In the absence of EVM tracking and monitoring, the Panel can only accept BC Hydro’s statement that the project schedule is “On Track” unless there is evidence that confirms the project is on schedule such as a Cost Performance Index and a Schedule Performance Index.

6.0 **Reference: Findings #5, 6, 7 & 8
Budget**

I support the following findings.

5.	The Panel finds that it is not yet in a position to determine whether the project will remain on schedule for completion by November 2024.	19
6.	The Panel finds that it is unable to determine whether the project is currently on budget.	22
7.	The Panel finds that if the river diversion is not achieved in September 2019, the project will not remain within its budget of \$8.335 billion.	32
8.	The Panel finds that it does not have sufficient information to assess the total possible budget overruns once the Site C project is complete.	33

F. BC HYDRO’S ABILITY TO DELIVER PROJECTS

The question is can BC Hydro deliver the project on time and on budget based on its past track record.

7.0 **Reference: Ansar**

In Ansar’s analysis, eight out of ten large dams suffered schedule slippage. Further, Ansar points out that “Large dams built everywhere take significantly longer than planners forecast”. In large projects this phenomenon is know as “engineering bias”. The Panel should heed Ansar’s cautions and consider the amount of engineering bias that may be embedded in the cost estimate and remove it before deciding on giving more weight to the evidence specific to Site C. Also, as EVM is not being used by BC Hydro, the Panel needs to further justify what evidence it has that allows it to reach this finding. The fact that EVM is not being used leaves the Panel “in the dark” for forecasting future outcomes.

8.0 Reference: Eliesen

Eliesen states that “the notion that Site C will be completed on time...is illusionary”. Of more interest is his other statements and comments.

It is the author’s considered opinion, based on many years of experience at a number of Canadian utilities—including BC Hydro—that the cost of Site C has a high probability of increasing from \$9 billion to \$12 billion—by more than 30 percent. Eliesen goes on to note that BC Hydro has not built a major hydro-generating station since the early 1980’s. He also points to some current BC Hydro projects:

- Northwest Transmission Line at 81 percent over budget,
- Interior to Lower Mainland Transmission Project at 24 percent over budget,
- Dawson Creek/Chetwynd Line at 16 percent over budget, and
- Iskut Extension Line at 61 percent over budget.

Eliesen outlines parallels for future probable cost over-runs as:

- large generating stations have not been constructed for decades;
- staff experienced in the planning and construction of mega projects have retired or moved on;
- there is a lack of contractor experience with large hydro projects in northern regions of Canada; and
- unexpected geotechnical issues.

The Panel should consider Eliesen’s comments very seriously as they all ring true and provide a convincing argument against BC Hydro’s Site C evidence that has been selected by the Panel.

9.0 Reference: Muskrat Falls, Wuskwatim and Keeyask

Deloitte(BCUC’s consultant) and Baker both show cost overruns varying from 40% to 78%

10.0 Reference: Finding # 10

10.	<i>The Panel gives more weight to the evidence specific to the Site C project than to the conclusions drawn by the Ansar study, which the Panel views as providing guidance on risks rather than specific evidence.</i>	34
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Considering the historical evidence, current performance of other dam projects, the future probably causes of cost over-run within BC Hydro, and the lack of EVM usage, the Panel may wish to reconsider its finding of relying solely on the Site C evidence.

G. THE CLEAN ENERGY ACT

11.0 Reference: Burrard Thermal & Columbia River Entitlement

The Clean Energy Act that enabled Site C to proceed exempt from BCUC oversight also prevents the

upgrade of Burrard Thermal (CEA, Part 2, Section 13) and use of the Columbia River Canadian Entitlement from being available as resources to BC Hydro. As both these generators of electricity exist, the political needs to be clarified as to whether the political will remains to exclude them from consideration. As the ratepayer is paying for the upkeep of Burrard Thermal, the cost to replace or modernize it should be a consideration. The Government should rule on whether or not these options are in play.

H. CONCLUSIONS

Since BC Hydro will not employ EVM tracking and monitoring of the Site C Project until December 2017 and the Panel's report must be issued on November 1, 2017, the Commission has been given the unenviable task of making a finding on schedule and costs without access to this useful information. If EVM had been used by BC Hydro, the Panel's tasks would have been much easier.

As Hydro-Electric dam construction is a narrow field of experienced erectors, the historical data takes on a greater significance. Usually engineering and construction staff move from project to project as one project winds down and another starts up. Hence, the same personnel may be involved in these other projects.

Mr. Eliesen's comment on experienced engineering staff is of concern and should receive more attention. As BC Hydro is not using EVM, a known industry standard, this alone calls into question the experience of the BC Hydro project management group.

The Panel needs to review the wording of its findings #4 and #10 as I believe a better finding could have been put forward.

Finding #4

For finding #4, the Panel should not agree that the project is "on track" but only state that in the absence of EVM data, it is left with accepting BC Hydro's statement.

Finding #10

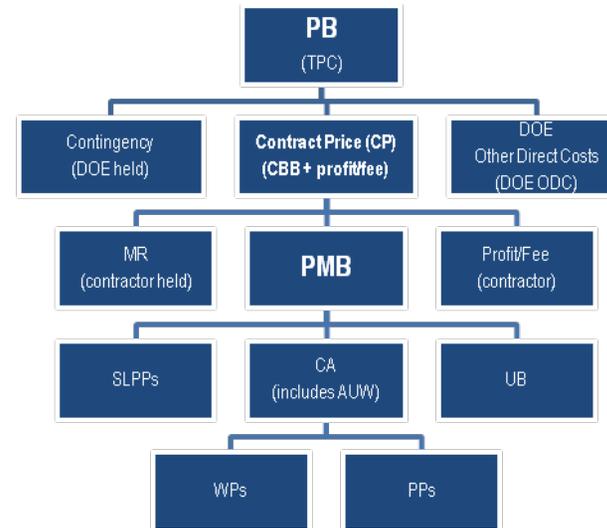
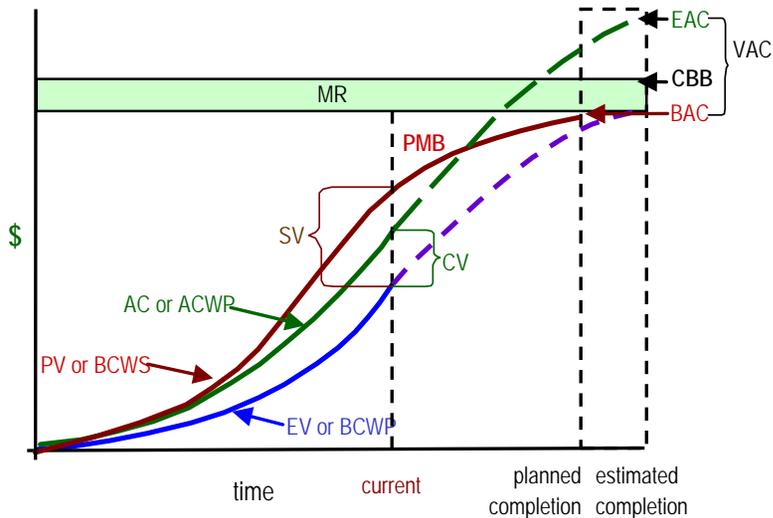
For finding #10, the Panel should acknowledge the concerns of the other commenter's and, in the absence of EVM data, acknowledge the risks to be considered.

Project Forecasted to Complete - Monte Carlo P90 Estimate

BC Hydro's estimate is a P50 estimate (equal probability (50%) that the cost will be higher or lower). While a P90 estimate has 10% probability to over-run, and 90% probability to under-run.

For the mandate given the Panel, comments received from others and increased certainty of the total cost, the P90 estimate would yield a larger contingency and satisfy some of Deloitte's concerns surrounding the low amount of contingency (14%) used by BC Hydro for a project of this size (i.e. 15%–20% of total project costs). My recommendation would be to use the P90 estimate for the Total Project Cost.

DOE EVMS GOLD CARD



PERFORMANCE BASELINE COMPONENTS

(Performance Baseline must clearly document scope/KPPs, TPC and CD-4 date)

- AUW= Authorized Unpriced Work (contractually approved, but not yet negotiated)
- CA = Control Account (includes AUW) = WPs + PPs
- CBB = Contract Budget Base = PMB + MR
- CP = Contract Price = CBB + profit/fee
- MR = Management Reserve is held by contractor (Contingency is held by DOE)
- PB = Performance Baseline (TPC) = CP + Contingency + DOE ODC
- PMB= Performance Measurement Baseline = CAs + UB + SLPPs
- PP = Planning Package (far-term activities within a CA)
- SLPP= Summary Level Planning Package
- UB = Undistributed Budget (activities not yet distributed to CA)
- WP = Work Package (near-term, detail-planned activities within a CA)

EVMS BASIC COMPONENTS*

- AC= Actual Cost = ACWP = Actual Cost of Work Performed
- EV= Earned Value = BCWP = Budgeted Cost of Work Performed
- PV= Planned Value = BCWS = Budgeted Cost of Work Scheduled
- BAC = Budget at Completion= Σ BCWS = Sum of Budgeted Cost of Work Scheduled

* For analysis purposes, AC, EV and PV calculations may be based on various time periods, e.g., monthly, cumulative, last 3 months from CD-2 or BCP or internal replan.

VARIANCES*

- CV = $EV - AC$ = $BCWP - ACWP$ = Cost Variance
- SV = $EV - PV$ = $BCWP - BCWS$ = Schedule Variance
- CV% = $(EV - AC) / EV$ = $(BCWP - ACWP) / BCWP$ = Cost Variance (%)
- SV% = $(EV - PV) / PV$ = $(BCWP - BCWS) / BCWS$ = Schedule Variance (%)
- VAC = $BAC - EAC$ = Variance at Completion

OVERALL STATUS

- % scheduled = PV_{cum} / BAC = $BCWS_{cum} / BAC$
- % complete = EV_{cum} / BAC = $BCWP_{cum} / BAC$
- % budget spent = AC_{cum} / BAC = $ACWP_{cum} / BAC$
- Work Remaining (WR) = $BAC - EV_{cum}$ = $BAC - BCWP_{cum}$

PERFORMANCE INDICES*

- CPI = EV / AC = $BCWP / ACWP$ = Cost Performance Index
- SPI = EV / PV = $BCWP / BCWS$ = Schedule Performance Index
- TCPI_{BAC} = $WR / (BAC - ACWP_{cum})$ = BAC-based To Complete Performance Index
- TCPI_{EAC} = $WR / (EAC - ACWP_{cum})$ = EAC-based To Complete Performance Index

COMPLETION ESTIMATES

- EAC = BAC / CPI_{cum} = Estimate at Completion (general)
- EAC_{CPI} = $AC_{cum} + WR / CPI_{cum}$ = Estimate at Completion (CPI)
- EAC_{composite} = $AC_{cum} + WR / (CPI_{cum} \cdot SPI_{cum})$ = Estimate at Completion (composite)
- ETC = $EAC - AC_{cum}$ = Estimated to Complete