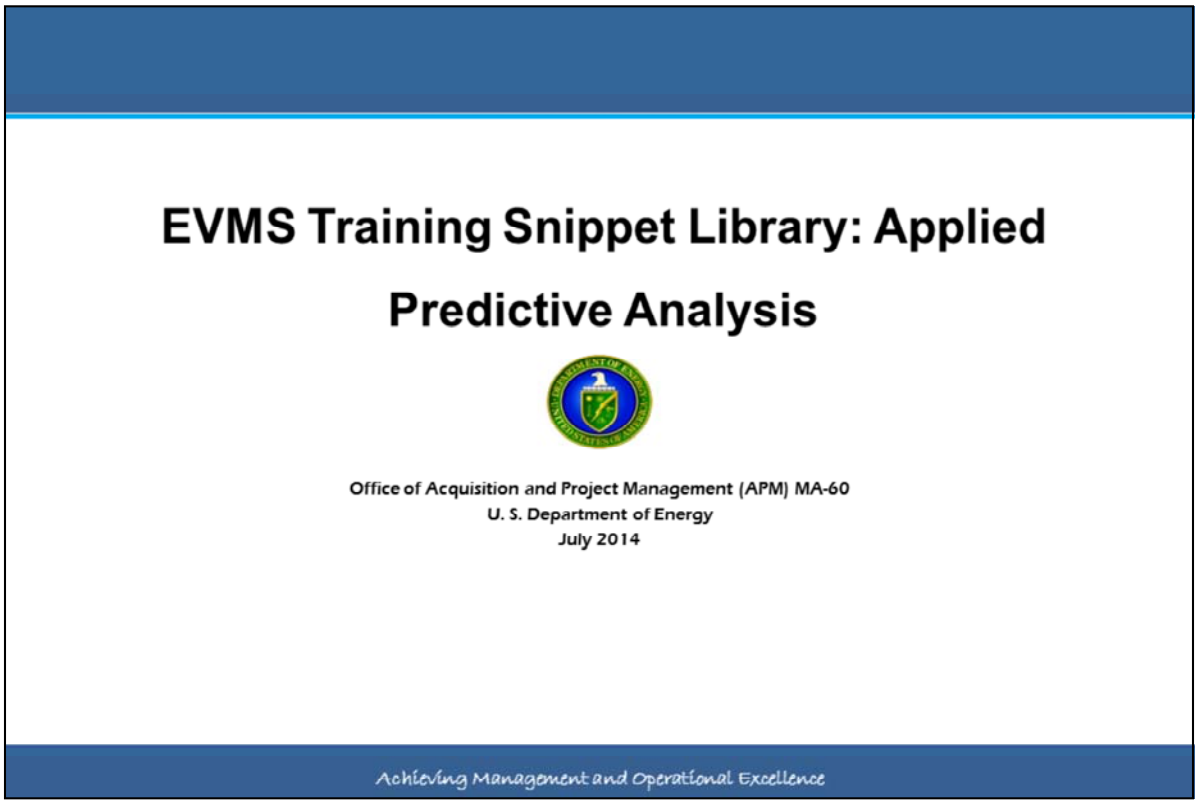
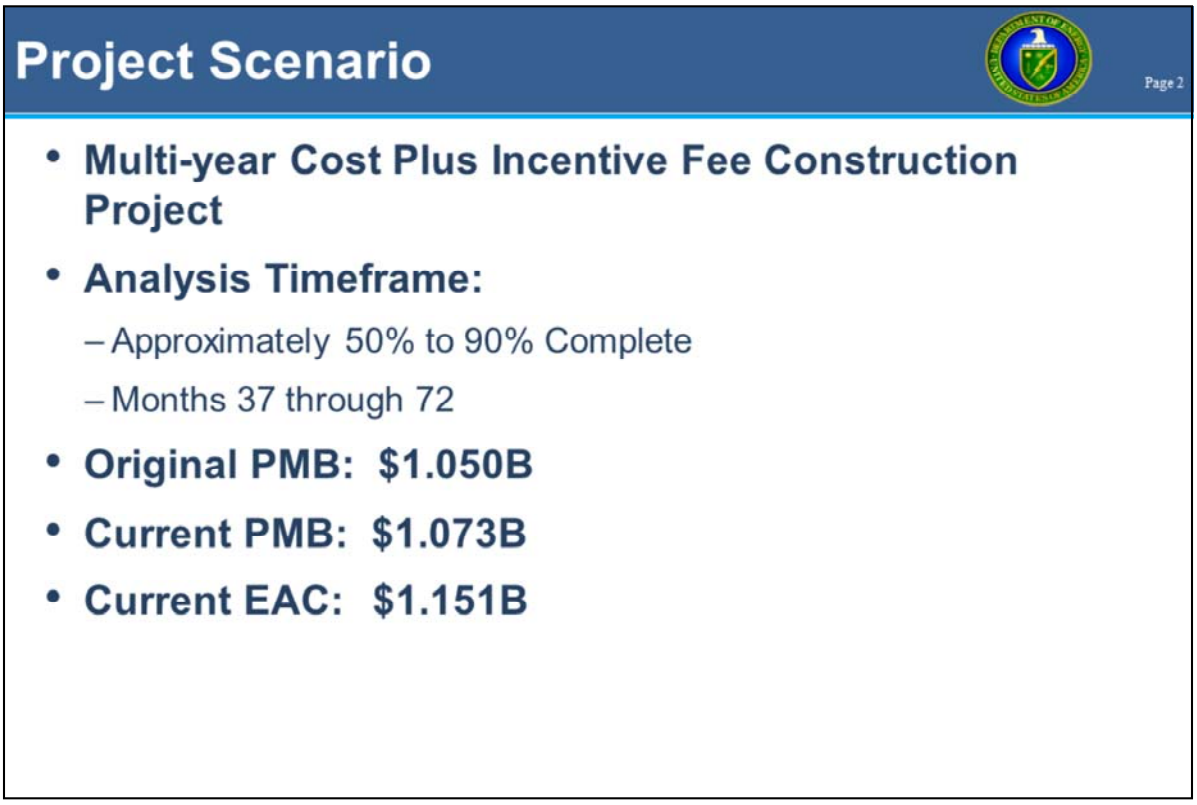
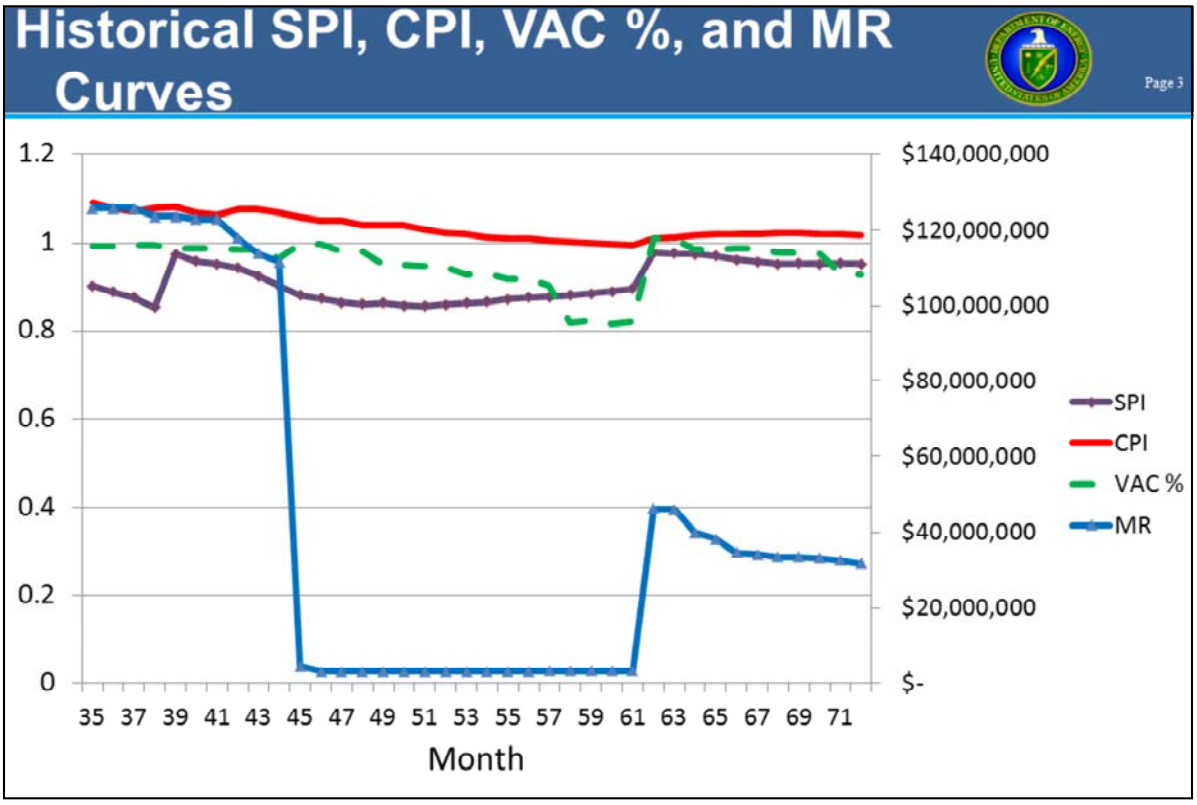


This EVMS Training Snippet, sponsored by the Office of Acquisition and Project Management (OAPM) provides examples of using PARS II analysis reports to examine current performance and use it to predict future performance.

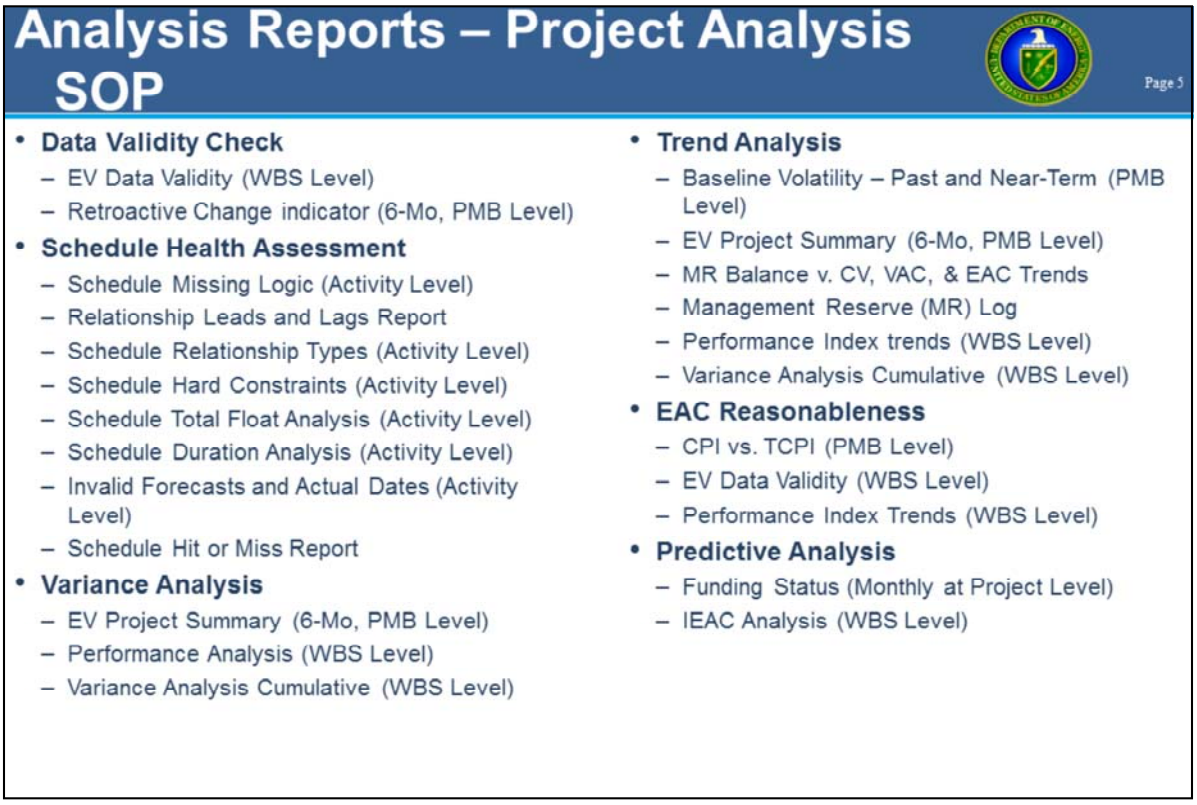


Before we review the PARS II analysis reports, we need to understand the Project scenario used in this Snippet. We have a multi-year Cost Plus incentive Fee construction project. The timeframe of our analysis is between 50 to 90% complete. The original Performance Management Baseline (PMB) was $1.050B, the current PMB is $1.073B, and the current EAC is $1.151B.

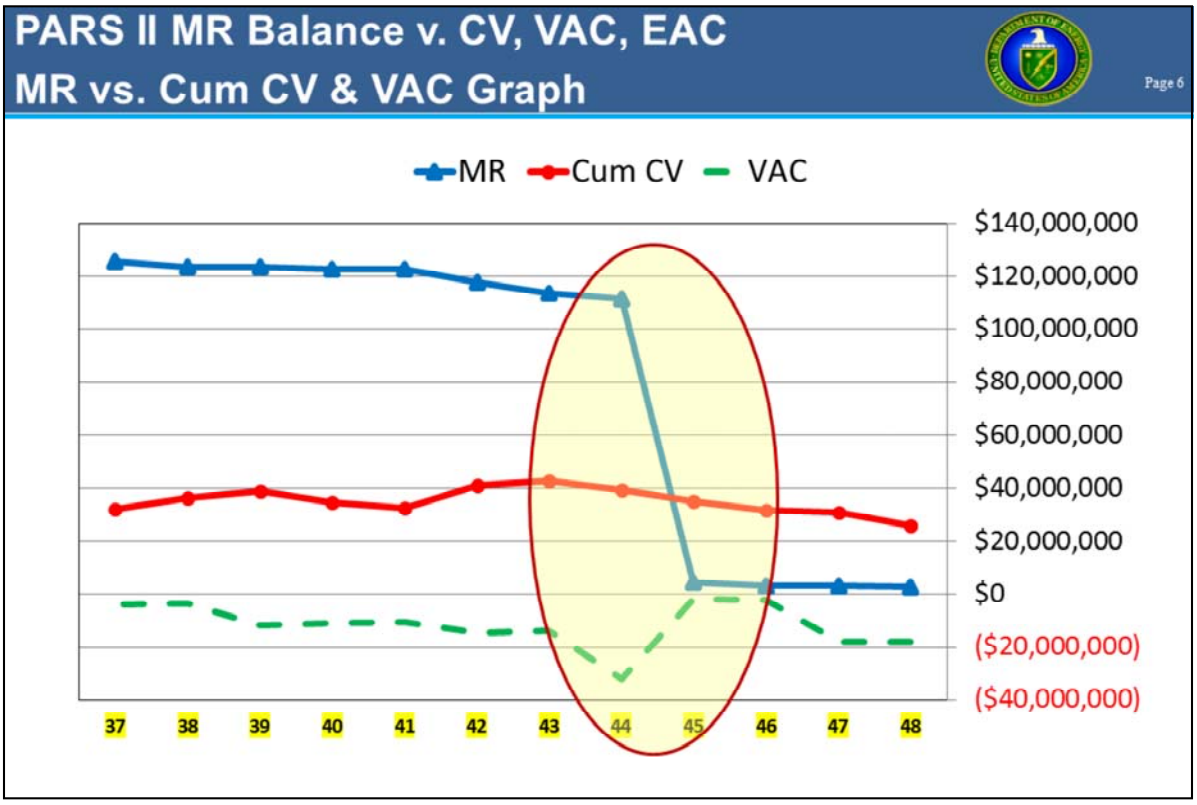


These are the curves associated with the project used in this historical scenario. The sharp increases and decreases in the MR, VAC, and cost variance values are all concerning. This project cost growth exceeded the total project cost. The intent of this snippet is to use the reports in PARS II that would help us find the issues before a surprise breach.

When conducting project analysis, there is a wealth of information at your fingertips in the PARS II Reports folder entitled “Analysis Reports – Project Analysis SOP”. In bold on the slide are the subfolders used to organize the reports into buckets identified for different aspects of the analysis process as explained in the DOE OAPM’s EVMS Project Analysis Standard Operating Procedure. Under each bucket are the individual reports that support that phase of project analysis. These reports are also explained in detail in the OAPM Snippets Training Library, Group 5.



For the purposes of this Snippet, we will focus on just a few of these reports to demonstrate how quickly you can identify performance concerns and anticipate what will happen over time when certain actions are taken. The scenarios covered in this Snippet are unfortunately not uncommon on DOE projects. Thus they are worthy of close examination and support lessons learned.



Using the PARS II MR Balance versus the CV, VAC, EAC Trends Report, and clicking on the MR versus. CV and VAC tab, we see this graph for the period of time from month 37 through month 48.

What does this graph tell us? Well, the most obvious change is in the blue MR line. Between months 44 and 45, the MR balance fell from $112M to $4.5M. That tells us that $107.5M worth of MR was applied to the baseline in one month. We also see that the Variance at Completion, that is the Budget at Completion minus the Estimate at Completion, improved during that same month. When an infusion of MR reduces the Variance at Completion, it is a sign that the MR was used to offset variances, either past or anticipated. Either way, this is a red flag.

Ask follow-up questions to the project manager based on this report.

- Regarding the Management Reserve:
    - What caused the use of the $107.5M management reserve? What are the current and projected risks? Is remaining MR adequate to cover those risks? If not, will the EAC be updated?

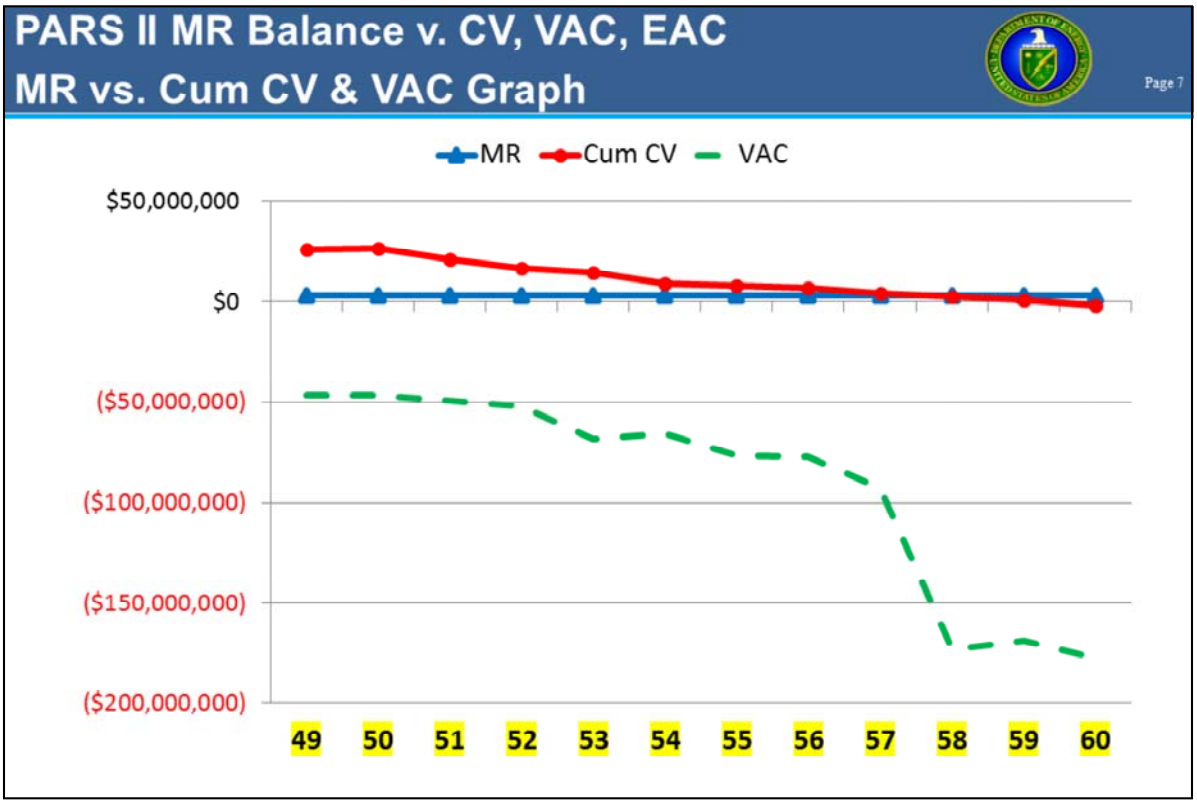
- Regarding the Variance at Completion:
    - What caused the VAC go down? The expectation is that with MR application, the VAC would not change because as the amount of budget for new work is allocated, the EAC would increase accordingly.

Either way, there are questionable practices at play that require further investigation and

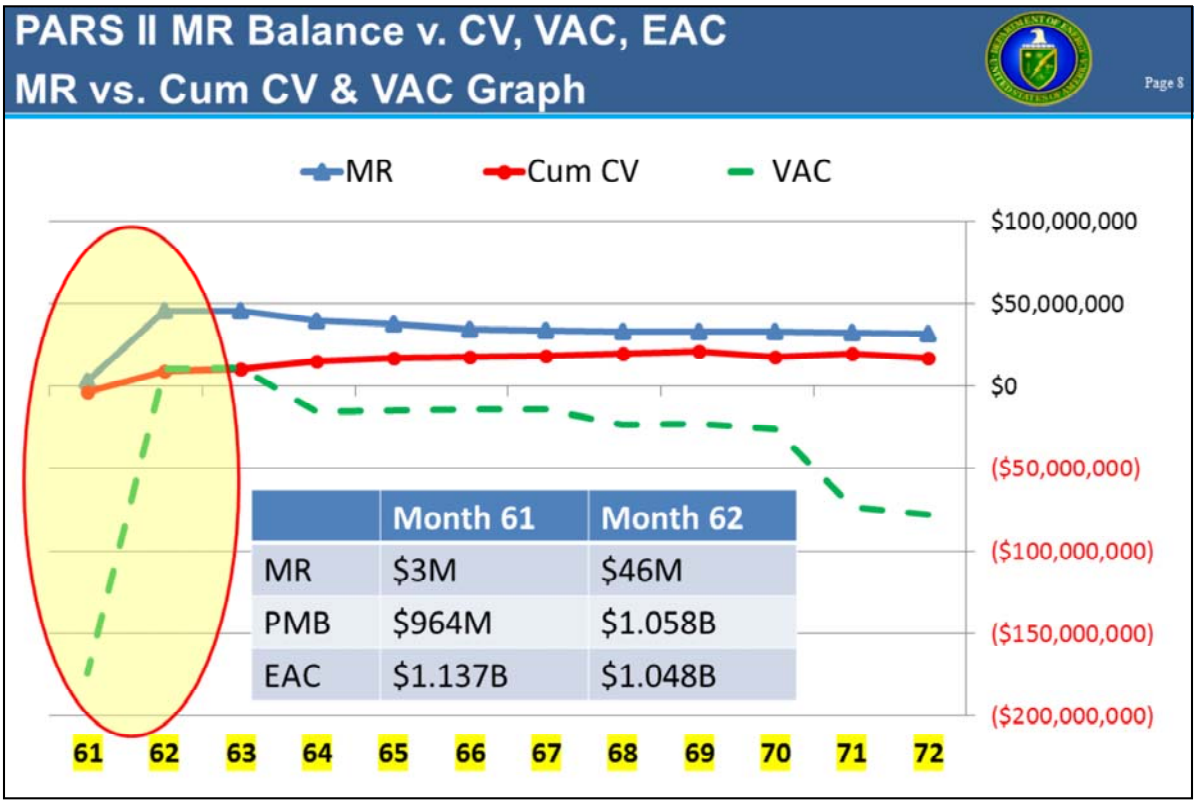
analysis.

We also see that although the Variance at Completion appeared to improve in Period 45, it didn't last long. Two months later it fell again.

Let's look at the next 12 month period for this project.



Looking at the next 12 months of data, months 49 through 60, we see that the Variance at Completion continues to fall, from $47M to $178M. Why is that happening? One suspicion is the lack of MR available to apply for the wrong reasons; that is for the sole purpose of offsetting past or future variances, the Estimate at Completion continues to grow. It could also mean that without any MR to properly manage additional scope within the existing Statement of Work in the contract and/or Project Execution Plan, the contractor is forced to carry everything as a variance when it may have been legitimate to use MR for realized risks.

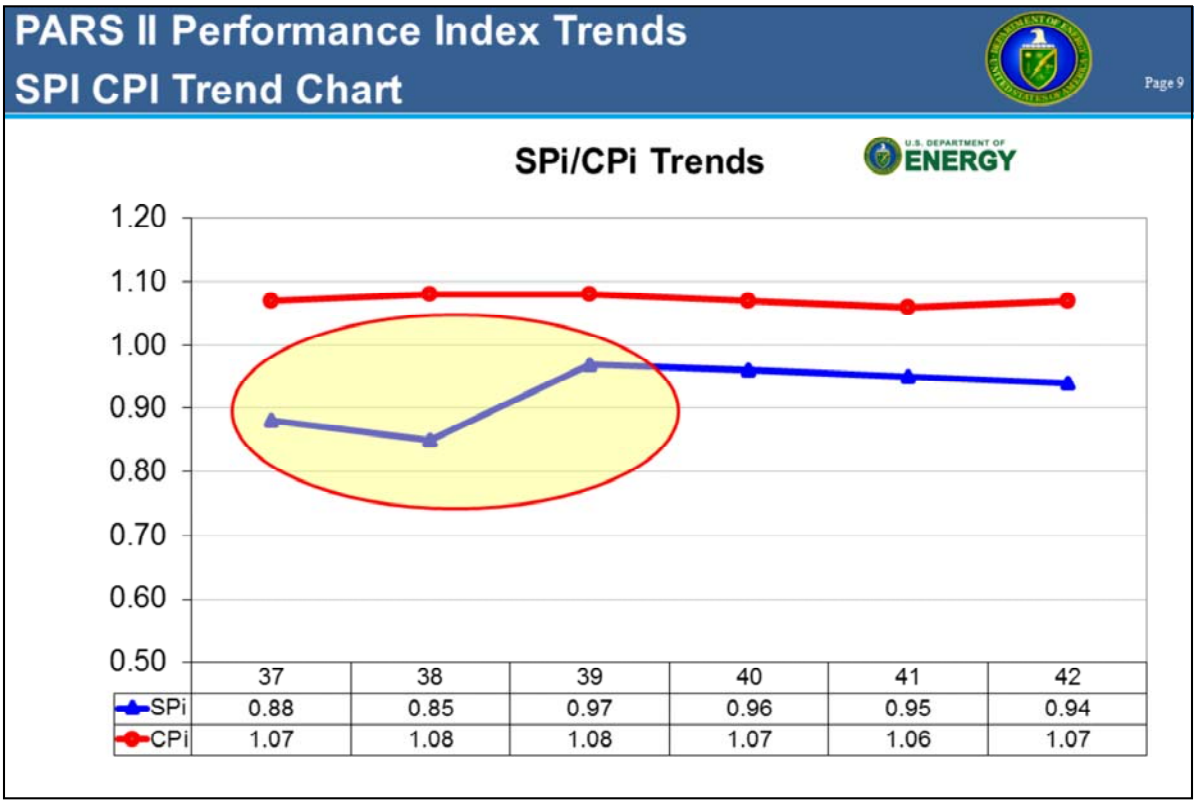


Looking at the next 12 months of data, months 61 through 72, we see that the Variance at Completion suddenly improved between month 61 and month 62, from an overrun of $174M to an underrun of $11M. Why is that happening? A review of the monthly data for these periods shows that MR was replenished, from $3M to $46M. We also see that the PMB increased from $964M to $1.058B. And somehow the Estimate at Completion actually decreased from $1.137B to $1.048B.

The behavior in the curves may have resulted from an addition of contingency funds to the project to cover contractor cost overruns, but which was improperly used to increase contractor budget despite addition of no new contract scope. As a result, the negative VAC was eliminated, true performance was masked, and an inaccurate EAC was reported. Please refer to snippet 4.3 for further explanation of MR, contingency, budget and funds.

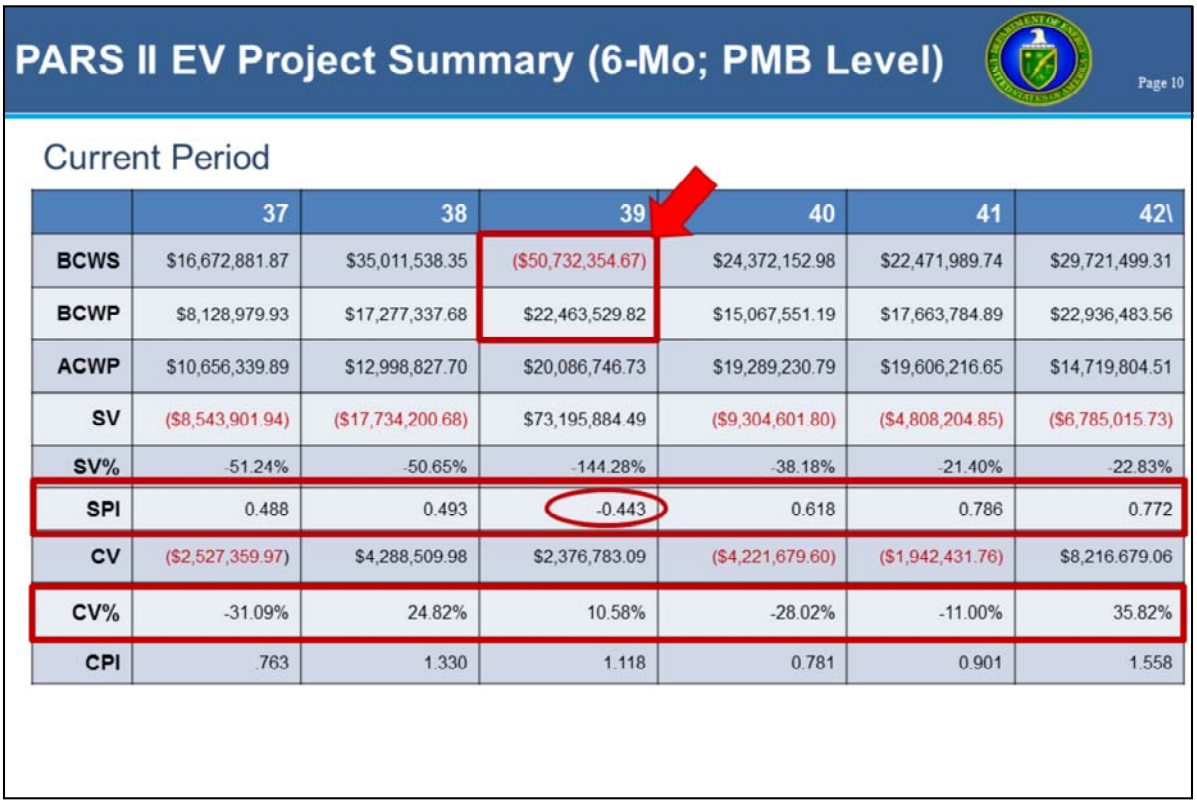
The questions to ask would be:

1. Why were variances eliminated when the BCP was executed primarily to address a cost overrun?
2. Why did the EAC go down when the PMB increased?



Here we see the PARS II Performance Index Trends Report, and we selected the SPI CPI Trend Chart. This report can be selected at any WBS level; here we selected it at the PMB level.

Notice the behavior of the SPI line (in blue). It had a dip and then a spike from the 2nd to the 3rd month of the six month curve. Since this chart is plotting cumulative values, a significant dip and spike in the cumulative is a red flag. Let's look at the Project Summary Report to see if we can determine what is happening.



	37	38	39	40	41	42\
BCWS	$16,672,881.87	$35,011,538.35	($50,732,354.67)	$24,372,152.98	$22,471,989.74	$29,721,499.31
BCWP	$8,128,979.93	$17,277,337.68	$22,463,529.82	$15,067,551.19	$17,663,784.89	$22,936,483.56
ACWP	$10,656,339.89	$12,998,827.70	$20,086,746.73	$19,289,230.79	$19,606,216.65	$14,719,804.51
SV	($8,543,901.94)	($17,734,200.68)	$73,195,884.49	($9,304,601.80)	($4,808,204.85)	($6,785,015.73)
SV%	-51.24%	-50.65%	-144.28%	-38.18%	-21.40%	-22.83%
SPI	0.488	0.493	-0.443	0.618	0.786	0.772
CV	($2,527,359.97)	$4,288,509.98	$2,376,783.09	($4,221,679.60)	($1,942,431.76)	$8,216,679.06
CV%	-31.09%	24.82%	10.58%	-28.02%	-11.00%	35.82%
CPI	.763	1.330	1.118	0.781	0.901	1.558

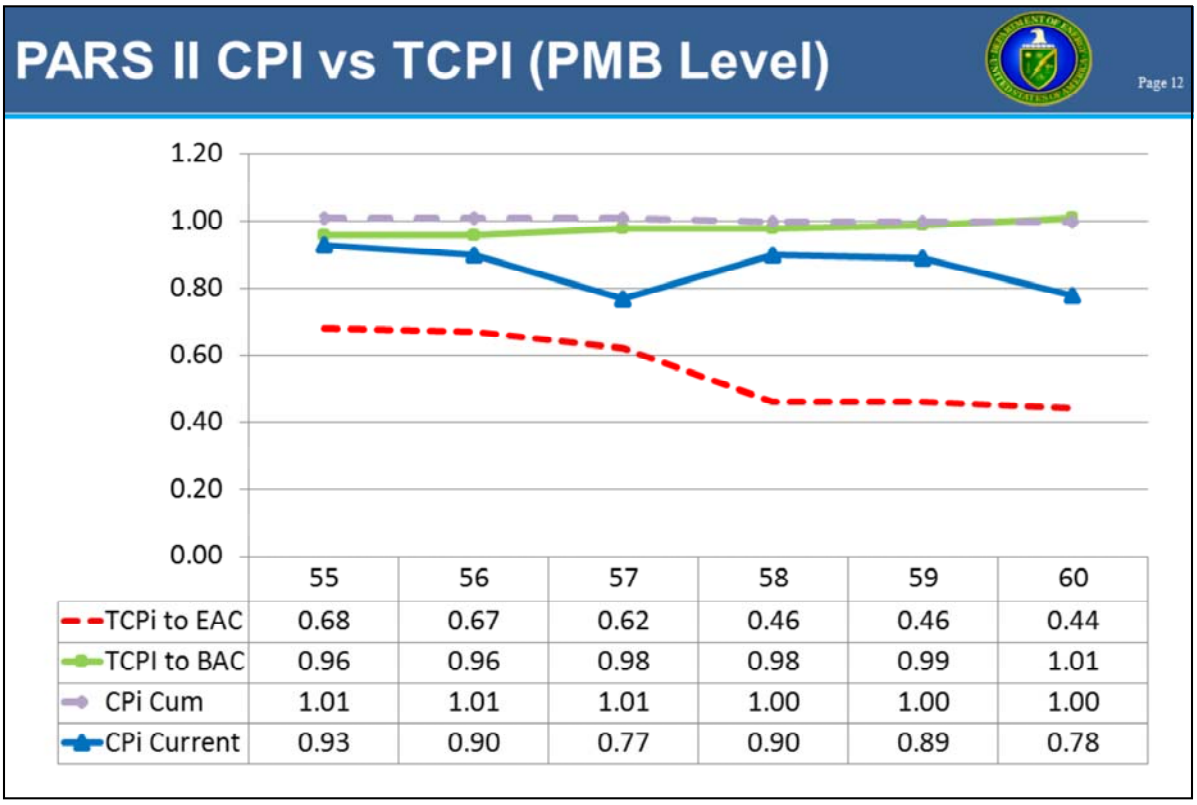
When we compare the monthly SPI to the Cumulative SPI, we see that during the month there was a significant spike, the monthly SPI was negative point 443. What that means is that there was a retroactive change to the BCWS. When looking at the Current Period BCWS, we see it is negative $50,732,354. The earned value, or the BCWP, was positive $22,463,529. Does it make sense that there was negative work planned, and a positive amount of work was completed? When retroactive changes are made to the plan, it impacts the performance indices and makes it difficult to use them as predictors. Such changes need sufficient explanation, and underlying causes should be investigated, identified and corrected.

Also take a look at the current period CPI. It, too, is fluctuating greatly over the six month period. Let's examine the CPI and TCPI curves next.

PARS II CPI vs. TCPI (PMB Level)

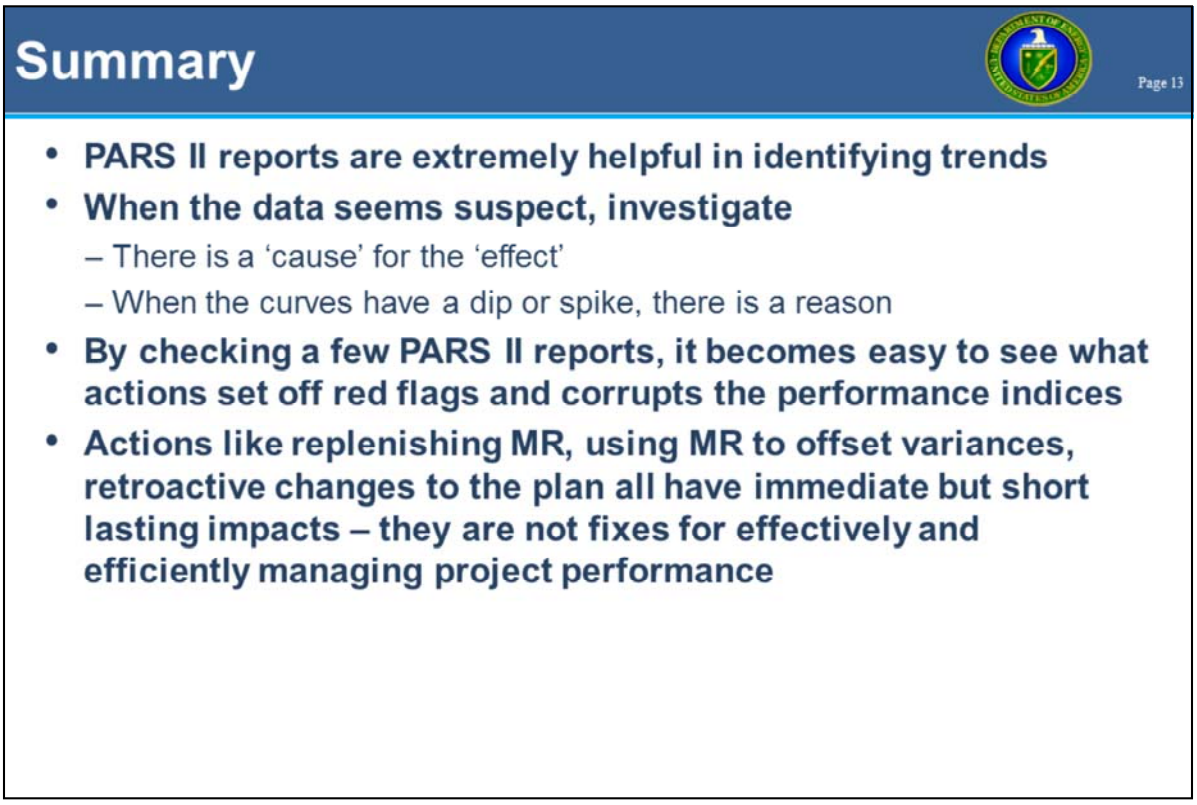
	37	38	39	40	41	42
TCPi to EAC	0.92	0.91	0.88	0.89	0.89	0.86
TCPI to BAC	0.93	0.92	0.91	0.91	0.91	0.89
CPi Cum	1.07	1.08	1.08	1.07	1.06	1.07
CPi Current	0.76	1.33	1.12	0.78	0.90	1.56

Here are the CPI curves for the same timeframe as we were just looking at. This is around the 50% to 60% completion point. We are seeing significant monthly fluctuations in the current period relative to cost performance. The cumulative is very high, well over 1.0. It appears that the contractor, if he continues at this rate, will come in well under the BAC. We know that because the TCPI to BAC is less than the performance that has been achieved for the first 50% of this project. But the fluctuation gives us some doubts. Let's jump to the end of the project in the next slide to see how things are going.



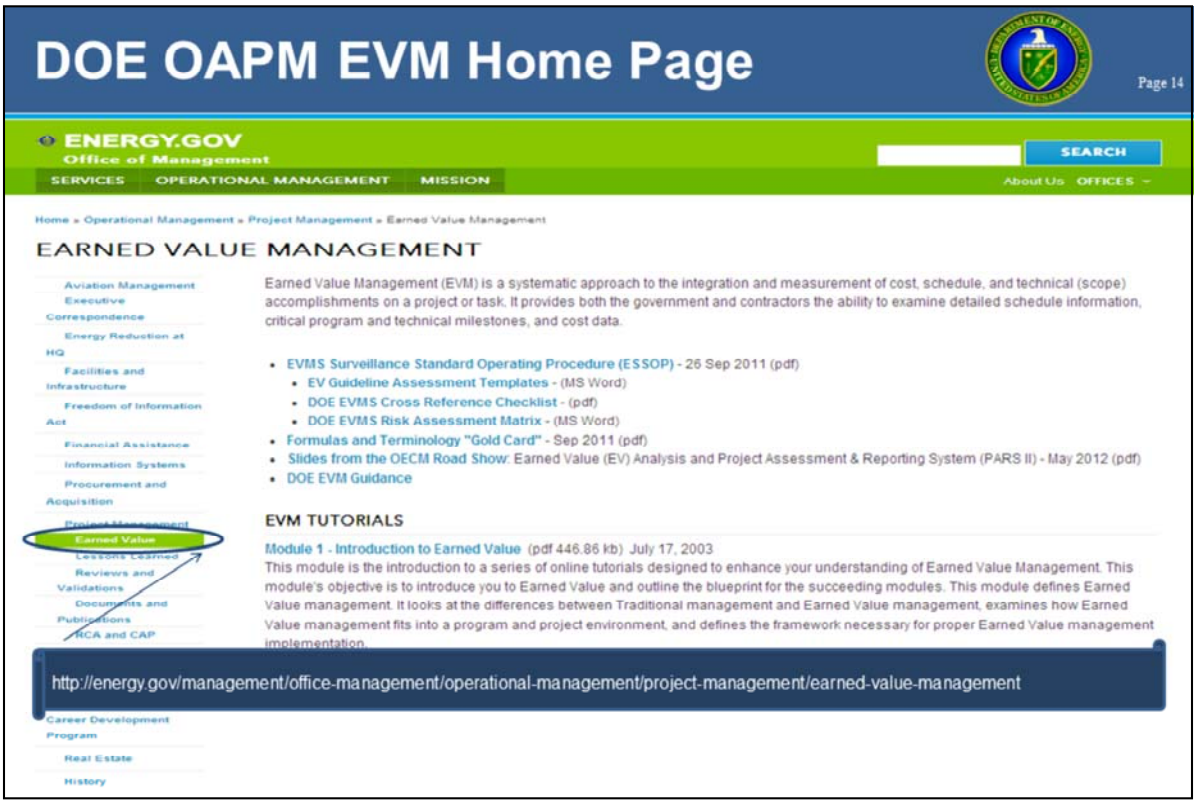
	55	56	57	58	59	60
TCPi to EAC	0.68	0.67	0.62	0.46	0.46	0.44
TCPI to BAC	0.96	0.96	0.98	0.98	0.99	1.01
CPi Cum	1.01	1.01	1.01	1.00	1.00	1.00
CPi Current	0.93	0.90	0.77	0.90	0.89	0.78

Now we are late in the project, around 85% to 90% completion. What is this graph telling us? The current period CPI is unstable, with fairly significant swings. The Cumulative CPI, used to smooth out the curve, shows it is falling very slowly. But the most surprising information on the graph is that the TCPI to EAC is extremely low. That tells us that the contractor's EAC is very pessimistic, and that given the cumulative CPI of 1.0, the contractor only has to achieve a performance of less than .5 to achieve the EAC. In other words, the contractor is predicting he will only be half as efficient for the remainder of the project, approximately 10% left to go, as he was for the entire 90% so far. Does that sound like a realistic EAC to you?



In summary, we have seen that PARS II reports are extremely helpful in identifying trends. When the data seems off or suspect, investigate because there is a root cause for every subsequent effect to the EVM data curves or performance indices.

Learn what actions are good fixes in terms of project management and be able to identify those actions that are only a temporary band aid approach and which set off red flags. Actions such as replenishing MR, using MR to offset variances, and retroactive changes to the plan all have immediate but short lasting impacts; they are not long term fixes to effectively and efficiently manage the project and complete it successfully within the approved scope, cost and schedule baseline.



For information relative to EVMS procedures, templates, helpful references, and training materials please refer to OAPM's EVM Home page. Check back periodically for updated or new information.