



# The Department of Energy's Project Reporting and Assessment System (PARS)

## PARS Empower Metrics and DQI analysis, Module 8 PARS User Advanced Training

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Welcome to the eighth and final session of the Department of Energy's Project Reporting and Assessment System advanced user training. This session is approximately 50 minutes in length. In this course the focus will be on the user, which include the contractor managing the project, the federal project director, the DOE program oversight, and DOE headquarters independent project analysis, using the tools in Empower to better look at projects performance data. The analysis and reporting capabilities of PARS provide decisions makers at all levels to best manage these projects over their lifecycle. In this course we will look at how to evaluate the data being provided by a contractors EVMS in to the Empower tool.

**Slide 1**

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**YA(1)**      **Need to update to align with IP2M METRR, new Empower audit exports. Remove GL slide**  
Young, Amber (CONTR), 3/1/2024

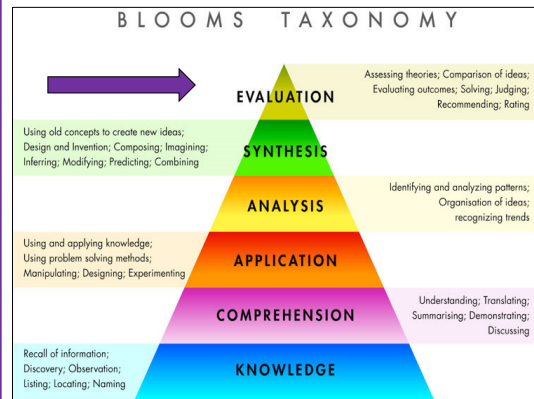


# Training Objectives

- Assess which Empower and PARS tools and capabilities to use in analyzing projects.
- Apply DOE EVMS and Project Analysis Standard Operation Procedure to projects
- Evaluate Projects using appropriate dashboards, views, charts, and reports information
- Assess data provided to DOE through the use of EVMS metric tests and data quality reports
- **Metrics and DQI in Empower**

## AT COMPLETION - EARN 8 CEU/PDUS

- Federal Employees – Will be added to CHRIS
- Contractor Employees – Certificate will be emailed MZW3



This eighth and final session of the advanced capabilities within PARS instance of Empower is to provided ANALYSIS capabilities, as outlined in the pyramid to the right. The Blooms Taxonomy for Analysis focuses on Identifying and analyzing data, in this case identifying the health of the EVMS to believe that data quality is good and that the user has high confidence in its use to control a project as well as to manage the project for leadership at all levels. This is the basis of evaluation to ensure that it is not a case of garbage in garbage out. This is used by all – contractors to self surveil and by federal users to have confidence in the reported values.

Most of the concepts here are NOT covered in the EPASOP directly, but indirectly addressed data quality concerns associated with specific test. Keep in mind, surveillance requires that both cost and schedule data exist and in some cases prior periods is needed to further provide proper Metrics results. Let's get started

Slide 2

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**MZW3** How to provide credit? - Sig  
Matthew Z West, 8/25/2020



## Surveillance Overview - Metrics

- The purpose of the DOE Metrics is to assess risks and demonstrate the implementation of the EVMS
- Ensure compliance with EIA 748 and DOE 413.3B
- Use data to help surveil an EVMS to see if the implementation under the contractors System Description has compliance to data process
- Centers around non-compliance or common areas of surveillance findings
- Provides uniformity and consistent assessments and subjective results
- DOE has compiled a list of 184 Metrics test based on the 10 IP2M METRR subprocesses for surveillance measurement
- DOE test nomenclature is Subprocess.Attribute.Test (for example A.01.02 is Subprocess A. Organizing, Attribute A.1, Test 2)

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The purpose of the DOE Metric tests in Empower is to assess risks and demonstrate the implementation of the EVMS is being used properly. DOE has developed key Metric test to subjective determined the this goals are being met by the contractor. Several documents are used as guidelines to ensure compliance : EIA 748 and DOE 413.3B. The DOE Earned Value Management System Compliance Review SOP provide details with respect to these metrics and is available in the PM-MAX site under Earned Value.

In the review process, reconciling to the internal System Descriptions compliance to cross check the Metrics is a key part of surveillance

Centers around non-compliance or common areas of surveillance finding. Flag in the audit metrics are not failures, but need to be reviewed and either corrected or understood.

Provides uniformity and consistent assessments and subjective results. By using the many of the automated test, we are taking out personal interpretation and subjectivity out of the equation, where possible, not to mentioned the countless hours it takes to manually do some test where Empower can quickly provide the

proper results.

DOE has compiled a list of 184 Metrics test based on the IP2M METRR for surveillance measurement, aligned to attributes. The DOE test identifier is Subprocess.Attribute.Test (for example A.01.02 is Subprocess A. Organizing, Attribute A.1, Test 2)



## Importance of Surveillance – Metrics, DQI, DIQ

- When conducting analysis, data accuracy and reliability is important specially to make informed decisions
- Within Empower Data Quality Indicators (DQI) are in addition to the metric tests and are designed to trigger if data quality issues are found in your data
- In the new JSON schema, there will also be Data Integrity and Quality (DIQ) checks
- DQIs and DIQs provide confidence in the quality of the data when all flags are understood or corrected
- Empower calculates DQI automated based on Cost and Schedule data
- DQI, DIQ, and Metrics are not the “end game”, but more of beginning to further compliance/surveillance to investigate if:
  - Are there certain DQI that are trending each month?
  - Is this data issues/anomaly systemic?
  - Is it a process, training or tool related issue?

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When conducting analysis, data accuracy and reliability is important specially to make informed decisions

Data Quality Indicators (DQI) are designed to trigger if data quality issues are found in your data - provides confidence in the quality of the data

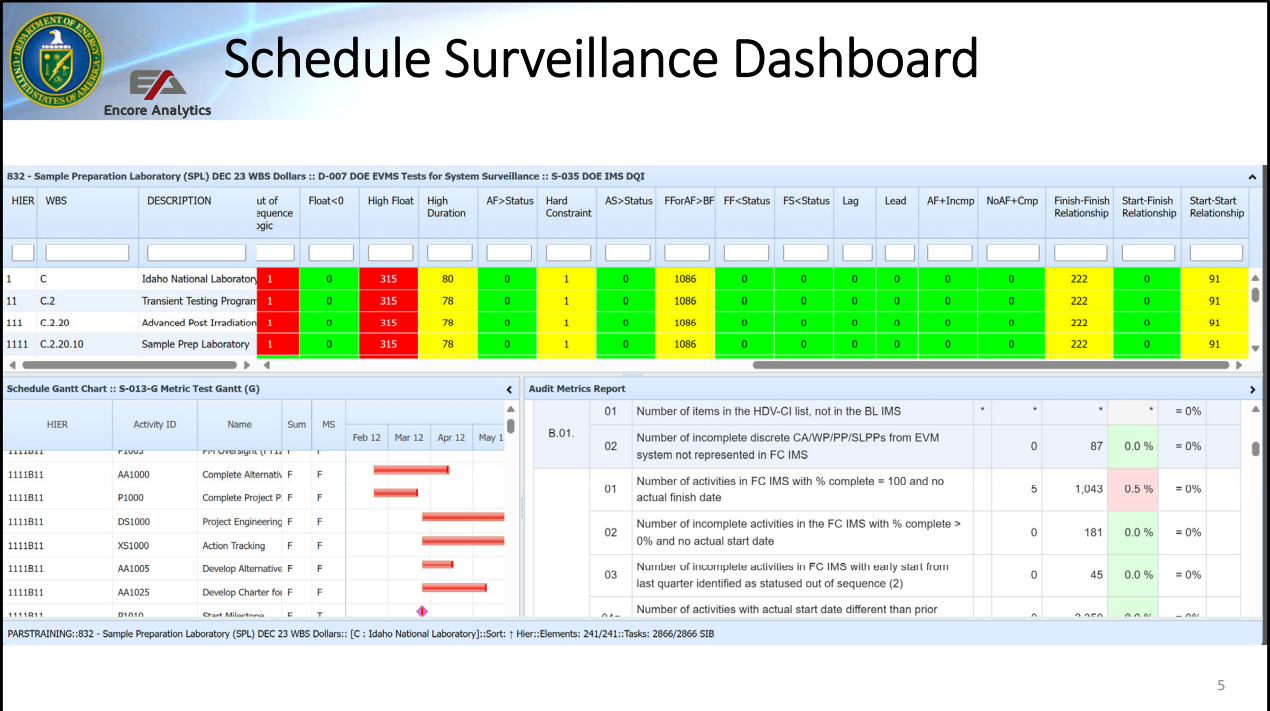
Empower calculates the automated based on Cost and Schedule data. This is time saving event, in some instances, this may save days of manual checking and cross checking

DQI, DQIs, and Metrics are not the “end game”, but more of beginning to further compliance/surveillance to investigate if:

Are there certain DQI that are trending each month?

Is this data issues/anomaly systemic?

Is it a process, training or tool related issue?



This is an example of the Surveillance Dashboard with the schedule assessment view. The Surveillance Dashboard has multiple views which we will discuss shortly. However, the initial dashboard will come with the Gantt chart on the bottom left and the Audit Metrics Report on the bottom right. We will discuss each and every pane in greater detail in the coming charts.

Keep in mind, that although you are using this Dashboard, a user can update the View by selecting the Views > Global and choose the desire Metric View.





## Empower Metrics and DQI

- Empower has all 184 DOE Metric test, some manual, Hybrid or automated results
- Most of the Metrics use DQI's to calculate the results
- Currently, Empower has about 146 DQI divided into the 4 groups
- The four DQI groups are:
  - "E" - Earned Value – Data anomalies with EV data
  - "S" – Schedule – Schedule related checks
  - "I" – Integration Cost/Schedule – checks PoP between Cost and Schedule data
  - "F" – Forecast Reasonableness – TCPI > ABS .1
- Download the DQI and Audit Test – Help > Empower DQI Test Guide

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Just a little more information before the views. There are currently 184 Metrics in the DOE Metric test list. These Metrics are broken out into three different result criteria:

1. Manual Metric results – these test are designed to be manually calculated. Typically this metrics require subjective analysis, and manual review to come the results
2. Hybrid Metric results – these test are designed to provide partial results. Empower will calculate the Denominator and the Numerator will be manually calculated.
3. Automated Metric results – these test are fully calculated by Empower. These are test that DOE has determined can be calculated via the cost and schedule data provide.

Empower uses the Data Quality Indicators to calculate some Metrics. DQI's are pass or fail test that will then count towards the Numerator value of the Metrics. There are some test that use a special SQL command to calculate, but for the most part the DQI's are used.

Just to review from the Basic training course, the DQI's are broken into 4 different

categories: ESIF

- E – for Earned Value, checks data anomalies associated with EV data. For example SV on LOE WP or negative BCWS Cum.
- S – for Schedule data, checks many of the schedule assessment check. For example missing logic and negative float.
- I – for Integration of Cost and Schedule, checks for period of performance between cost and schedule data. Example WP BCWS end in Sep20, Schedule shows baseline till Dec20.
- F – for Forecast Reasonableness based on the TCPI > ABS .1

Additionally, user can download the DQI and Audit Test to review the DQI's associated with each test. We will cover that now.



## DQI # and associated Test

- List the DQI number, this will be useful in identifying which Metric uses this Test
- Test Group:
  - 1 – Earned Value
  - 2 – Forecast
  - 3 – Schedule
  - 4 – Integration PoP C/S
- Alias is the short name used in Empower
- Description of Alias in an easy to understand detail

DQI	Name	Alias	Test Group	Sums	Description
1	T1	S>B	1	T	BCWS CUM > BAC
2	T2	P>B	1	T	BCWP CUM > BAC
3	T3	AwoB	1	T	ACWP CUM with no BAC
17	T17	PC<0	1	T	Negative BCWP CUR
18	T18	EachHigh	2	F	CPI-TCPI > 0.1
19	T19	EacLow	2	F	CPI-TCPI < -0.1
20	T20	NoPred	3	T	No predecessor
21	T21	NoSucc	3	T	No successor
22	T22	Lead	3	T	Leads
23	T23	Lag	3	T	Lags
24	T24	ReISF	3	T	SF relationship
25	T25	ReISS	3	T	SS relationship
36	T36	IncmpBEI	3	T	BEI Incomplete
37	T37	IncmpCEI	3	T	CEI Incomplete
38	T38	FS<A	4	T	Forecast start before first ACWP/ETC
39	T39	FS>A	4	T	Forecast start after first ACWP/ETC
40	T40	FF<ETC	4	T	Forecast finish before last ACWP/ETC
41	T41	FF>ETC	4	T	Forecast finish after last ACWP/ETC
42	T42	BS<S	4	T	Baseline start before first BCWS
43	T43	BS>S	4	T	Baseline start after first BCWS
44	T44	BF<S	4	T	Baseline finish before last BCWS

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By downloading the Empower DQI Test Guide a user can look at which DQI Empower is using to a specific Metrics. Why would you want to do this? Good question, the reason is because many want to know how Empower derives the calculation results. Most individuals are not willing, at least initially of ‘trusting’ the results from Empower, so DQI are provide as small step to understand the results. If you agree with the DQI then you can add those up and come up with the validated results on your own.

The views are based on the DQI, so when verifying the data results in the Sort window it will be based on the DQI count.

In the screen you the DQI number, internal name in Empower starts with a “T” and the Alias or short description if you will.

Test group is broken out a shown on the screen:

1. Earned Value
2. Forecast
3. Schedule
4. Integration of C/S

Sums, we denote of this DQI will roll from the bottom up the WBS tree structure and sum the total from the bottom. An “F” denote it the values do not sum from the bottom.



## DQI # and associated Metric Test

- Cross reference the DQI# to the appropriate Attribute & Metric Test
- Automate test only
- Some test may have multiple DQI's
- If the Metric test is missing, then that test uses a SQL command to calc the values

GL	Metric	DQIs	Description
1	2.03	101	Number of incomplete BL activities where EVM WBS code does not match FC IMS WBS code
3	1.01	102	Number of incomplete WPs where linked activities physical % complete does not match p
3	1.02	38,39,40,4	Number of incomplete CA/WP/PP where FC IMS start or finish do not align with EVMS AC
3	1.03	40,41	Number of incomplete discrete WP/PP/SLPP where FC IMS finish does not align with time
3	1.09	103	Number of CA/WP/PP/SLPP having BL IMS WBS codes that do not match EVMS WBS code
5	1.01	92	Number of CAs with no responsible or more than one responsible OBS
5	3.01	93	Number of CAs with no assigned or more than one assigned CAM
5	4.02	104	Number of CAs with greater than 7% L1 BAC and 10% L1 BCWS that exceed CV or SV thresh
6	1.02	69	Number of incomplete discrete WP/PP/SLPPs from EVM system not represented in FC IMS
6	2.01	46	Number of activities with percent complete = 100 and no actual finish date in FC IMS
6	2.02	146	Number of activities identified as stasued out of sequence in FC IMS
6	2.03	58	Number of activities missing actual start dates with physical percent complete > 0%
6	02.04a	56	Number of activities with actual start date different than prior report
6	02.04b	57	Number of activities with actual finish date different than prior report
6	2.05	105	Number of incomplete activities and milestones in BL IMS not represented in FC IMS

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The next tab is the Audit Test information, the list shows all the Automate test only. You will notice the Guideline (Attribute) and Metric test with the associated DQI test and then the descriptions.

Note that some test are single DQI and other test require multiple DQI test to measure the entire Metric. For example, Attribute 5 03.01 uses DQI test 93 which is **CAtCAM<>1**. If this particular metric tripped, then Empower will show a count of 1 for that CA. As I mentioned earlier, not all test use DQI, but the majority will, some use a special SQL command to calculate.

For test that require SQL command, this are advance functionality and not covered in this training session.



## Checks on Learning – DQI and Metrics

1. Why conduct surveillance on the contract?
  - A. Not worth the time, lots of data, too much of a hassle
  - B. Compliance with DOE 413-3B
  - C. To be compliant with EIA-748
  - D. Ensure if Contractor is effective using their System Description properly
  - E. Answer B, C and D are correct
  - F. All are correct
2. When doing Surveillance which are true?
  - A. The Audit Report is the end game, no further analysis is need
  - B. Some Data Quality Indicator are used to test metrics
  - C. Data quality is important and needed for reliability
  - D. Reveals compliance with System Description
  - E. Answer A and C are correct
  - F. Answer B, C and D are correct
3. Data quality indicator checks for?
  - A. Earned value data quality
  - B. Integration of cost and schedule data quality
  - C. Schedule data quality
  - D. Forecast reasonableness
  - E. All are correct
4. Empower uses the following to derive the quality checks.
  - A. Contractor Cost and schedule data
  - B. Data Quality Test Metrics
  - C. SQL Commands when necessary
  - D. Answers A, B and C are all correct
  - E. Answers B, C are all correct



## IP2M METRR Overview

- Audit Metrics reports documents key Metrics of the EVMS complies with the 32 Guidelines and the IP2M METRR:
  - A. Organizing
  - B. Planning & Scheduling
  - C. Budgeting & Work Authorization
  - D. Accounting Considerations
  - E. Indirect Budget & Cost Management
  - F. Analysis and Management Reporting
  - G. Change Control
  - H. Material Management
  - I. Subcontract Management
  - J. Risk Management

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Before we start the various views discussion, lets take a half step back to understand how the views are organized. As you can see, the Metrics are aligned with the 32 Guidelines for EVMS compliance. Those guidelines are sub broken out by 5 sections:

1. Organization covers guidelines 1 – 5
2. Scheduling and Planning guideline 6 and planning 7-15
3. Accounting covers guidelines 16-21
4. Analysis and Reports Guideline 22-27
5. Revisions guideline 28 -32

The 32 Guidelines align with the IP2M METRR Subprocesses:

- A. Organizing
- B. Planning & Scheduling
- C. Budgeting & Work Authorization
- D. Accounting Considerations
- E. Indirect Budget & Cost Management
- F. Analysis and Management Reporting
- G. Change Control
- H. Material Management
- I. Subcontract Management

## J. Risk Management

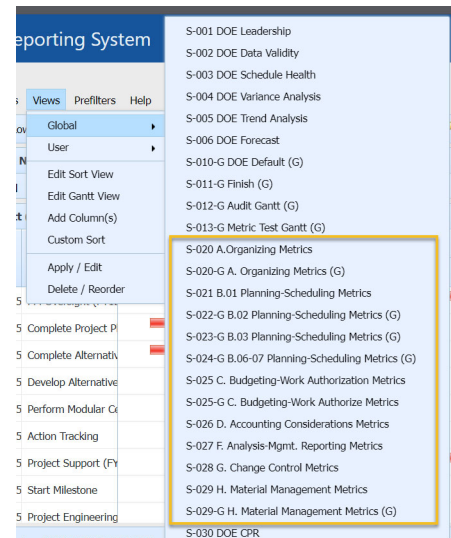
Empower has grouped the Views in line with these subprocesses. With a few exceptions B will have several views since there is a lot of metrics in that group. The views are conveniently labeled so that you select the appropriate views.





# Metrics Analysis Views

- Various Audit Metrics Analysis View broken out by Guidelines
- Gantt Chart with Metrics Gantt View
- Audit Metric Report
  - List of all DOE Metrics by Attribute
  - Some test are manual, meaning inputs are required by the user
  - Some test are Hybrid, meaning the Numerator input is require
  - The rest of the test are Automated, Empower calculated



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Just one more slide before we get to the Views. The list in front of you is the break out of the individual Views, we attempted be in line with the guidelines, but truthfully, it was based on screen size that limited. You do not want to see 40 columns in one view, so those we broke out into two views.

There are Gantt Views that will display the necessary schedule data to assist in validating the Metric test. PARS has several Gantt Views, you notice them because the have an (G) at the end of the description.

The bottom right of the Dashboard will have the Audit Metric Report. The report has the details of the all the Metrics, manual, Hybrid and Automated. We will cover the Metrics in some detail in the coming slides.

All the Sort Views will have a mix of standard data (BCWS, BCWP...) mixed with DQI Views. Let's get to the Views..



## DOE Audit Metrics Report & Analysis

Attribute	Metric	Test	M	Value	Total	Percent	Goal	Note
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- Guideline number 01 to 32
- Attribute.Metric – a subset list of metrics for each IP2M METRR Attribute
- Empower will generate three type of results in column “M”
  - Manual results: “\*” - require manual input for Numerator/Denominator values
  - Hybrid results: “+” - Empower generates the Denominator, user will manually input the Numerator values
  - Automated results – Numerator and denominator values are generated by Empower
- Test – description of the test –important to understand what is being evaluated
- Each results will consist of Numerator - Value and Denominator - Total
- Percent is result of Value/Total
  - Green color denote that metric did not trip for that contract
  - Red color denotes that metric trip the threshold established by DOE

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The Audit Metrics Report will display a list of the DOE Metric Test, whether Manual, Hybrid or automated, I will explain that in moment. The report has header information as the column and we will explain those columns now:

Attribute.Metric – a subset list of metrics for each Guideline (Attribute

Test – this is a short description of the test. This is overlooked at times, but it is full of useful information such as:

- Whether a test is complete or Incomplete
- At what level, CA, WP/PP or contract level
- If element/activity is discrete or LOE
- Dollar value or Count
- What value is being evaluated: BCWS, BCWP, ACWP, EAC...
- Is it Cost or schedule data
- What Element of Cost is being evaluated
- Baseline or Forecast data

As you can see from this list, Test is descriptive and exact on what is being evaluated. Most mistakes in validating the number is a misunderstanding of what is being evaluated.

Empower will generate three type of results in column "M"

Manual results: "\*" -require manual input for Numerator/Denominator values

Hybrid results: "+" -Empower generates the Denominator, user will manually input the Numerator values

Automated results – Numerator and denominator values are generated by Empower

Each results will consist of Numerator - Value and Denominator - Total

Percent is result of  $\text{Value}/\text{Total}$

Green color denote that metric did not trip for that contract

Red color denotes that metric trip the threshold established by DOE



# Audit Metric Report Results

- Attribute and Metric with short description of the test
- Value and Total with resultant Percent value with color
- “\*” denotes a Manual test
- “+” with “?” in the Value denotes this is Hybrid test
- “?” with no color:
  - Data is missing or does not exist
  - Contract table is not properly configured

D.01.	01	Number of WP/PP by EOC where direct costs are not consistent with the disclosure statement or time cards audit	*	*	*	*	*	= 0%
D.02.	01	ACWPCum in EVMS <=> ACWPCum in accounting system	*	*	*	*	*	= 0%
D.03.	01	\$ total of non-material and non-overhead CA/WP ACWPCum where ACWPCum > \$1K and BCWPCum <= 0		661,536	130,846,968	0.5 %	<= 1%	
	02	\$ total of non-material and non-overhead CA/WP BCWPCum where BCWPCum > \$1K and ACWPCum <= 0		76,327	128,714,986	0.1 %	<= 1%	
	03	\$ total of non-material and non-overhead CA/WP BCWPCur where BCWPCur > \$1K and ACWPCur <= 0		59,877	1,211,776	4.9 %	<= 1%	
	04	\$ total of non-material and non-overhead CA/WP ACWPCur where ACWPCur > \$1K and BCWPCur <= 0		193,787	1,805,962	10.7 %	<= 1%	
	05	\$ total of complete non-material and non-overhead WP abs BCWPCum where ACWPCum <= 0		34,029	38,989,342	0.1 %	<= 1%	
	06	\$ total of complete non-material and non-overhead WP abs ACWPCur where BCWPCur <= 0		264,202	1,805,962	14.6 %	<= 1%	
D.04.	01	Number of CA where ACWPCur <-> IPMR F1 total ACWPCur	+	?	25	*	= 0%	

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Lets continue with the discussion of the Audit Metric Report. There are several items to consider before embarking in validating the data.

Value and Total with resultant Percent value with color. The color will match with the desired threshold, meaning if Green, no failures and if Red failure count or value exceed the Metric threshold.

“\*” denotes a Manual test. This test will need to be evaluated manually and inputted data manually into Empower. A topic that was covered in the basic course.

“+” with “?” in the Value denotes this is Hybrid test. Empower will calculate the Denominator (Total) but the user will need to manually derive at the Numerator (Value)

“?” with no color: This one is sometime overlooked and may be an issue with how certain tables in Empower are configured:

One representation is that Data is missing or does not exist. For example in the slide, test D.04.01 we see a “?” in the Percent value. Empower displays a “?” to signal to check the data.

Another example of a & is on the C.08.05, 50-50 metric - Contract table is not properly configured, this is common on new contracts that have not been properly configured. An example of that could be that test fo 50-50 does have 50-50 in the EVT, but the TP50 Symbol in the Contracts value does not match the 50-50 EVT value in schedule.



## Schedule Value in the Sort window

- Complete – 0 = incomplete 1 = Complete
- Tasks – count of tasked 'linked' to that element.
  - Count matches the Gantt Chart count
  - 'Linked' – EVMS WBS matches IMS activities
- Incomplete Tasks – count of tasks with Actual Finish is null
- Discrete Tasks – count of tasks where the activity EVT in the schedule is not LOE
- B/L Incmp Task – count of task incomplete on the Baseline tasks

% Complete	% Spent	Complete	Tasks	Incomplete Tasks	Discrete Tasks	B/L Incmp Tasks	CAM
75.80	76.03	0	6221	233	225	233	
96.74	106.12	0	850	70	70	43	
0.53	0.48	0	1014	940	845	932	
81.43	79.13	0	815	97	74	97	

Schedule Gantt Chart :: S-012 Audit Gantt (6)

HIER	Act. ID	WbsNum	2020
			October January April July October January
1111161	C2		
1111211	C2		
1111341	C2		
1111351	C2		
1111151	C2		
1111331	C2		
1111122	C2		

Admin::(All Contracts) CUR-0 WBS Dollars:: [redacted] ::Sort: 1 Hier::Elements: 3065/3065::Tasks: 1014/1014

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You probably have seen these columns in all our previous Views, this is probably a good time to discuss what they represent.

Complete is a check to see if the Element is complete or not. A value of 0 = incomplete and value of 1= complete. This is useful when doing Metric validation on categories that are incomplete, you simply filter for a 0 and Empower will display all incomplete elements in the sort window.

Tasks – is a count of how many activities/tasks are 'linked' to that Element. Keep in mind, that element may be WP, CA or Summary level WBS element. The count value will be the same as the count in the Gantt chart, just make that element the 'active element'. What is 'linked' you may ask? Linked is when an activity WBSnum (LinkVal) matches the cost WBSnum (LinkVal); thus we have a match to the Element in the sort window. If they do not match we have an 'unlinked' condition and Empower assigns the activity to an WBS element called [Unlinked Tasks].

Incomplete Tasks – count of the linked tasks to that element with Actual Finish is null

Discrete Tasks – count of the linked tasks to that element with an Activity EVT in the

schedule is not LOE. Empower can be configured to tell what is the LOE symbol for the activity.




# Checks on Learning – DQI Metrics

- Which of the following is true about WBS 5.05.40.02?
  - It is incomplete and there 126 linked Activities
  - It is complete and there 126 linked Activities
  - There are 65 out of 126 Activities that are Discrete Activities
  - There are 66 activities remaining to be completed
  - Answer A, C and D are correct
  - Answer B, C and D are correct
- What can you tell me about Metric Test Views?
  - Just like every view just pick one
  - They are named for the Attribute they represent
  - The views follow the IP2M METRR numbering
  - Answer B and C are correct
  - All of the above
- What can you tell me about Metric Test 22.02.01?
  - An automated test that is not properly configured
  - Data is missing that is why the “?” is displaying
  - It is a hybrid test that need the Value
  - It is not properly configured that is why “?” is displayed

WBS	LL	LVL	Complete	Tasks	Discrete Tasks	Incomplete Tasks
<input type="text"/>	<input type="text"/>	4	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
5.05.40.01	T	4	0	207	28	29
5.05.40.02	L	4	0	126	65	66
5.05.40.03	C	4	0	114	13	14
5.05.40.04	C	4	0	48	11	11
5.05.40.05	T	4	0	198	95	96
5.05.40.06	C	4	0	58	24	25

F.01.	01	Number of CAs with incorrect variance calculations	+	?	25	*	= 0%
	02	Number of incomplete in-progress discrete WPs with BCWPCur not consistent with BCWScur and EVT or activity EVTs in FC IMS	+	?	37	*	= 0%





# S-020 A. Organizing Metrics and Gantt

832 - Sample Preparation Laboratory (SPL) NOV 23 WBS Dollars :: D-007 DOE EVMS Tests for System Surveillance :: S-020 A.Organizing Metrics

HIER	WBS	DESCRIPTION	CAM	LVL	LL	ET	% CMP	EVM	BAC	BCWS	BCWP	ACWP	ETC	EAC	A.01.05	A.04.01	A.04.02	A.04.03	A.05.02	A.05.05	A.05.07
111111	C.2.20.10.10.20.ZZ	C.2.20.10.10.20 Suspense	Harris AJ	7	x	WP	0.00	NA	0	0	0	0	0	0	2	0	0	0	0	0	0
111111	C.2.20.10.10.30	APIE Project Integration	Orchard Brady J	6		CA	100.00	NA	143,496	143,496	143,496	143,496	0	143,496	0	0	0	0	1	1	0
111111	C.2.20.10.10.30.10	APIE Project Integration - Wor	Orchard Brady J	7	x	WP	100.00	PCT	143,496	143,496	143,496	143,496	0	143,496	1	0	0	0	0	0	0
111111	C.2.20.10.10.30.77	C.2.20.10.10.30 Suspense	Orchard Brady J	7	x	WP	0.00	NA	0	0	0	0	0	0	0	0	0	0	0	0	0
111111	C.2.20.10.10.40	Design & Construction Integra	Harris AJ	6		CA	94.16	NA	18,694,137	17,602,670	17,602,670	20,229,836	1,356,500	21,586,336	0	0	0	0	1	1	2
111111	C.2.20.10.10.40.10	APIE Design and Construction	Harris AJ	7	x	WP	100.00	PCT	189,927	189,927	189,927	189,927	0	189,927	1	0	0	0	0	0	0
111111	C.2.20.10.10.40.20	Design & Construction Integra	Harris AJ	7	x	WP	100.00	PCT	352,996	352,996	352,996	352,996	0	352,996	1	0	0	0	0	0	0

- Subprocess A. Organizing metric tests will be shown in this view
- Green denotes no failure/tripped with a value of '0'
- Red will have a failure and if Sum = T, the lower level trips will sum up
- S-020-G is a Gantt sort view corresponding to metrics using schedule data in A. Organizing metrics

832 - Sample Preparation Laboratory (SPL) NOV 23 WBS Dollars :: D-007 DOE EVMS Tests for System Surveillance :: S-020-G A. Organizing Metrics (G)

HIER	LINK	WbsNum	ActivityID	EVM	MS	% CMP	A.04.09	BL Start
11111111	C.2.20.1	C.2.20.10.10.10.10	CD3010	PCT	F	100	1	2020-04-27
11111111	C.2.20.1	C.2.20.10.10.10.10	CD3060	PCT	F	100	1	2020-04-27
11111111	C.2.20.1	C.2.20.10.10.10.10	CD3062	PCT	F	100	1	2020-04-27
11111111	C.2.20.1	C.2.20.10.10.10.10	CD3064	PCT	F	100	1	2020-04-27
11111111	C.2.20.1	C.2.20.10.10.10.10	CD3066	PCT	F	100	1	2020-04-27
11111111	C.2.20.1	C.2.20.10.10.10.10	CD3070	PCT	F	100	1	2020-04-27
11111111	C.2.20.1	C.2.20.10.10.10.10	CD3080	PCT	F	100	1	2020-04-27

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Introducing the S-020 A. Organizing Metrics, you guess it, this contains the automated test results for Subprocess A. Organizing.

In this view you will find all of the automated metrics within Empower and whether they flag or not.

Viewing this sort view S-020 alongside the Audit Metrics Report in the A. area will give you greater insight into the metrics and their results. There is also a Gantt sort view for this subprocess. To have this Gantt view show in the sort window, go to Views, Global, and hold shift then click on the S-020-G and you will see the sort view change to have schedule data and the A.04.09 metric available.

In the sort view, you can hover over any of the metric IDs in the column headers to see the metric short title, or find it on the Audit Metrics Report below the sort view.

Schedule is probably the most challenging because it involves cost, schedule and identification of the Activity ID to determine the cause. In some cases, it can be a one to many relationship with the WP to Activity. I find it useful to use a Prefilter called “Find UID (G)” to narrow down the list of activities the UID/Activity ID that tripped the Metric.

To identify in which WP, drill down to the Lowest Level (LL) or use the Lowest button and select the element as the Active Element and look at the Data Quality Indicators Report for details.

At this point, I find it useful to use a Prefilter called “Find UID (G)” to narrow down the list of activities the UID/Activity ID that tripped the Metric.

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Associate the number in the header box with the DOE Metric you are validating. The key is to:

- Read the detail check for what is testing: Complete or incomplete, Discrete or not.
- What are the DQI (s) being used to check the Metrics

- Do the analysis at the lowest level by going to the Lowest button in the toolbar
- At the LL, find the 'red' condition you want to validate, the Gantt and reports will make more sense and less data to review at the WP level.
- Check to see if the Metric requires several DQI's to fully do the Metric check

When using the View, have the Gantt Chart open and analyze at the WP level to get the details in the Data Quality Indicators Report





# S-025 C. Budgeting & Work Authorization and Gantt

832 - Sample Preparation Laboratory (SPL) NOV 23 WBS Dollars :: D-007 DOE EVMS Tests for System Surveillance :: S-025 C. Budgeting-Work Authorization Metrics

HIER	WBS	DESCRIPTION	ET	CAM	% CMP	EVM	C.05.01	C.07.02a	C.07.02b	C.08.01	C.09.01	C.09.02	BAC
11111	C.2.20.10.10.10.ZZ	C.2.20.10.10.10 Suspense	WP	Harris AJ	100.00	PCT	1	0	0	0	0	0	
11111	C.2.20.10.10.20	Project Management	CA	Harris AJ	74.71	NA	0	0	0	0	1	1	7,2
11111	C.2.20.10.10.20.10	APIE Project Management	WP	Harris AJ	100.00	LOE	1	0	0	0	0	0	
11111	C.2.20.10.10.20.20	Project Management - Design	WP	Harris AJ	100.00	PCT	1	0	0	0	0	0	1,4
11111	C.2.20.10.10.20.40	Project Management - Work Pl	WP	Harris AJ	70.31	LOE	1	0	0	1	0	0	6,4

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HIER	LINK	WbsNum	ActivityID	EVM	MS	% CMP	BL Start	BL Finish	C.08.02	C.08.05	C.09.04	C.09.05	BL Dur
111122	C.2.20.1	C.2.20.10.10.20.20	SPLMS01	OTHER	I	100	2020-04-27	2020-04-27	0	0	0	0	0d
111123	C.2.20.1	C.2.20.10.10.20.40	SPL10002	LOE	F	16	2023-10-02	2024-09-30	0	0	1	1	250d
111123	C.2.20.1	C.2.20.10.10.20.40	SPL10312	LOE	F	0	2024-10-01	2025-11-25	0	0	1	1	291d
111123	C.2.20.1	C.2.20.10.10.20.40	SPL11315	LOE	F	28	2023-10-02	2024-04-23	0	0	1	1	140d
111123	C.2.20.1	C.2.20.10.10.20.40	SPL6852	LOE	F	100	2020-05-26	2020-09-30	0	0	0	0	91d
111123	C.2.20.1	C.2.20.10.10.20.40	SPL7457	LOE	F	100	2020-10-01	2021-09-30	0	0	0	0	251d
111123	C.2.20.1	C.2.20.10.10.20.40	SPL7977	LOE	F	100	2021-10-04	2022-09-29	0	0	0	0	249d

## S-026 D. Accounting Considerations

832 - Sample Preparation Laboratory (SPL) NOV 23 WBS Dollars :: D-007 DOE EVMS Tests for System Surveillance :: S-026 D. Accounting Considerations Metrics

HIER	WBS	DESCRIPTION	.L	ET	CAM	% CMP	EVM	D.03.01	D.03.02	D.03.03	D.03.04	D.03.05	D.03.06	BAC	BCWS	BCWP	ACWP	ETC
11112	C.2.20.10.20.10	CD-2/3 Documents			CA	Harris AJ	100.00	NA	0	0	0	0	0	1,480,550	1,480,550	1,480,550	1,478,628	
11112	C.2.20.10.20.10.05	Nuclear Safety Documents	x		WP	Harris AJ	100.00	PCT	1	1	1	1	1	262,648	262,648	262,648	262,648	
11112	C.2.20.10.20.10.10	Critical Decision 2/3 Document	x		WP	Harris AJ	100.00	PCT	1	1	1	1	2	-0	-0	-0	-0	
11112	C.2.20.10.20.10.20	CD 2/3 Cost Estimate	x		WP	Harris AJ	100.00	PCT	1	1	1	1	1	165,548	165,548	165,548	165,548	
11112	C.2.20.10.20.10.30	CD 2/3 RFP & Award of Constr	x		WP	Harris AJ	100.00	PCT	1	1	1	1	2	500,335	500,335	500,335	500,335	
11112	C.2.20.10.20.10.40	CD-2/3 Documents - Work Pac	x		WP	Harris AJ	100.00	PCT	1	1	1	1	2	553,569	553,569	553,569	551,647	
11112	C.2.20.10.20.10.ZZ	C.2.20.10.20.10 Suspense	x		WP	Harris AJ	100.00	PCT	1	1	1	1	2	-1,551	-1,551	-1,551	-1,551	

To validate test, views shows ACWP and BCWP values next to the Metric test

When validating D. Accounting & H. Material Management (GL 16 & 21), use the Element of Cost Report as shown in this slide  
 Since the Metric is looking for Non Material and Material related issue for Current and Cumulative, showing the Element of Cost Report will assist in seeing those values.

Next Filter the lowest level, use the Lowest button on the toolbar

You can use the Interactive Filter to filter for Incomplete, and the appropriate test by filtering for "1".

Do a Sum and make the Summary element the active element, this will update the EOC Report to show the Sum for all element. It will assist in determining the Numerator and Denominator values for the specific a Metric test.



# S-027 F. Analysis and Management Reporting & Gantt

832 - Sample Preparation Laboratory (SPL) NOV 23 WBS Dollars :: D-007 DOE EVMS Tests for System Surveillance :: S-027 F. Analysis-Mgmt. Reporting Metrics

HIER	WBS	DESCRIPTION	Project	LVL	LL	ET	CAM	% CMP	EVM	F.05.03	F.05.06	E
					▼							
11111	C.2.20.10.10.20.20	Project Management - Design	832 - Sample Prepara	7	x	WP	Harris AJ	100.00	PCT	0	0	
11111	C.2.20.10.10.20.40	Project Management - Work P	832 - Sample Prepara	7	x	WP	Harris AJ	70.31	LOE	1	1	
11111	C.2.20.10.10.20.50	Project Reviews	832 - Sample Prepara	7	x	WP	Harris AJ	29.88	PCT	1	2	
11111	C.2.20.10.10.20.ZZ	C.2.20.10.10.20 Suspense	832 - Sample Prepara	7	x	WP	Harris AJ	0.00	NA	0	0	
11111	C.2.20.10.10.30	APIE Project Integration	832 - Sample Prepara	6		CA	Orchard Brady J	100.00	NA	0	0	
11111	C.2.20.10.10.30.10	APIE Project Integration - Wor	832 - Sample Prepara	7	x	WP	Orchard Brady J	100.00	PCT	0	0	
11111	C.2.20.10.10.30.ZZ	C.2.20.10.10.30 Suspense	832 - Sample Prepara	7	x	WP	Orchard Brady J	0.00	NA	0	0	



# S-028 G. Change Control

832 - Sample Preparation Laboratory (SPL) NOV 23 WBS Dollars :: D-007 DOE EVMS Tests for System Surveillance :: S-028 G. Change Control Metrics

HIER	WBS	DESCRIPTION	Project	LVL	LL	ET	CAM	% CMP	EVM	G.03.09	BA
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>
11111	C.2.20.10.10.20.20	Project Management - Design	832 - Sample Prepara	7	x	WP	Harris AJ	100.00	PCT	0	
11111	C.2.20.10.10.20.40	Project Management - Work P	832 - Sample Prepara	7	x	WP	Harris AJ	70.31	LOE	1	
11111	C.2.20.10.10.20.50	Project Reviews	832 - Sample Prepara	7	x	WP	Harris AJ	29.88	PCT	2	
11111	C.2.20.10.10.20.ZZ	C.2.20.10.10.20 Suspense	832 - Sample Prepara	7	x	WP	Harris AJ	0.00	NA	0	
11111	C.2.20.10.10.30	APIE Project Integration	832 - Sample Prepara	6		CA	Orchard Brady J	100.00	NA	0	
11111	C.2.20.10.10.30.10	APIE Project Integration - Wor	832 - Sample Prepara	7	x	WP	Orchard Brady J	100.00	PCT	0	
11111	C.2.20.10.10.30.ZZ	C.2.20.10.10.30 Suspense	832 - Sample Prepara	7	x	WP	Orchard Brady J	0.00	NA	0	



# Audit Metric Export Results - Excel

- Empower exports out a detail report of the all the Metrics to Excel
- Use Detail tab to:
  - Filter by Test ID
  - Filter by “Failed” test
  - Filter by CAM or WBS
  - Filter by UID (Activity ID)
- Use the Summary tab to:
  - Identify which Test are “Red”
  - Sort by Test with larges “Percent” value
- Use results to do an Excel Pivot

Attribu	Metric	TestID	Flagge	WBS	PROJ	UID	CAM
A.01.	05	A.01.05	x	C.2.20.10.10.10.ZZ			Harris AJ
A.01.	05	A.01.05	x	C.2.20.10.10.20.ZZ			Harris AJ
A.01.	05	A.01.05	x	C.2.20.10.10.30.ZZ			Orchard B
A.01.	05	A.01.05	x	C.2.20.10.10.40.ZZ			Harris AJ
A.01.	05	A.01.05	x	C.2.20.10.10.45.ZZ			Harris AJ
A.01.	05	A.01.05	x	C.2.20.10.10.60.ZZ			Butler Sad
A.01.	05	A.01.05	x	C.2.20.10.20.10.10			Harris AJ
A.01.	05	A.01.05	x	C.2.20.10.20.10.ZZ			Harris AJ
A.01.	05	A.01.05	x	C.2.20.10.25.10.95			Fabela-Jor
A.01.	05	A.01.05	x	C.2.20.10.25.10.ZZ			Fabela-Jor
A.01.	05	A.01.05	x	C.2.20.10.25.20.ZZ			Fabela-Jor
A.01.	05	A.01.05	x	C.2.20.10.25.30.ZZ			Landman
A.01.	05	A.01.05	x	C.2.20.10.25.40.ZZ			Landman

Attribute	Metric	Test	Num	Denom	Percent	Test	Goal	Result
A.01.	05	Number of WP/PP/SLPP where WBS code in EVMS -> BL IMS	28	197	14.2	=	0	R
A.04.	01	Number of incomplete WPs in the FC IMS where Labor Hour IMS % complet	36	78	46.2	<=	5	R
A.04.	02	Number of incomplete WP/PP where BL IMS start or finish do not align with	87	100	87.0	=	0	R
A.04.	03	Number of incomplete WP/PP where FC IMS start or finish do not align with	100	100	100.0	=	0	R
A.04.	09	Number of BL IMS WBS codes that do not match EVMS WBS code (5,7)	0	2,509	0.0	=	0	G
A.05.	02	Number of CAs with no responsible or more than one responsible OBS	0	25	0.0	=	0	G
A.05.	05	Number of CAs with no assigned or more than one assigned CAM	0	25	0.0	=	0	G
A.05.	07	Number of CAs with greater than 7% L1 BAC and 10% L1 BOWS that exceed	2	2	100.0	=	0	R
B.01.	02	Number of incomplete discrete CA/WP/PP/SLPPs from EVM system not rep	0	87	0.0	=	0	G
B.02.	01	Number of activities in FC IMS with % complete = 100 and no actual finish d	5	1,025	0.5	=	0	R
B.02.	02	Number of incomplete activities in the FC IMS with % complete < 0% and in	0	178	0.0	=	0	R
B.02.	03	Number of incomplete activities in FC IMS with early start from last quarter	0	38	0.0	=	0	G
B.02.	04a	Number of activities with actual start date different than prior report (1)	0	2,332	0.0	=	0	G
B.02.	04b	Number of activities with actual finish date different than prior report (1)	0	2,132	0.0	=	0	G
B.02.	05	Number of incomplete activities and milestones in BL IMS not represented	0	558	0.0	=	0	G
B.02.	06	Number of incomplete activities in the FC IMS current freeze period not in	0	214	0.0	<=	5	G
B.02.	07	Number of incomplete activities and milestones in FC IMS not represented	0	558	0.0	<=	1	G
B.03.	01	Number of incomplete activities and milestones in the BL IMS without preced	2	558	0.4	=	0	R
B.03.	02	Number of incomplete activities and milestones in FC IMS without precede	2	558	0.4	<=	1	Y
B.03.	03	Number of incomplete activities and milestones in BL IMS with at least one	0	558	0.0	=	0	G

In addition to the View to help find the element or activities that trigger a particular test, Empower also has an export to excel with the details of the all the automated matrix and failures. Some users like the Excel option because they are more familiar with filtering in Excel and the data can be pivoted for additional customized analysis.

The export is in the File > Export Audit Metrics and download an Excel file as shown in the top graphic. Two tabs will come with the file, Detail and Summary

The Summary Tab will provide the Num (Numerator) and Denom (Denominator), values along with the result percent and whether test is Red or Green. Another way to use this tab is to filter for “R” and then go the Detail tab to find the failed items.

Use Detail tab to:

- Filter by Test ID - Filter for the specific test. At this point the Excel row count will provide the Denominator value that is in the Summary Tab. The Num value count will show when filter by “Failed”.
- Filter by “Failed” to identify which WBS and associated UID (if applicable) and CAM again if applicable.
- Filter by CAM or WBS - If the data exist for CAM Empower will display the



CAM with associated row to show the CAM responsible for this test. A point of interest here, several organizations have used this spreadsheet to do a pivot on the CAM and then failed items. You can do this in the Views by filter for the CAM, but on for the view showing, in the Excel report, it will show for all Metric test.

Filter by UID (Activity ID) – some test, if applicable will have an associated UID/Activity ID. Empower will identify every activity that fail the specific Metric/DQI.



# Audit Metric Trend Report Results

- Audit Trends Report provides up to 6 periods of Audit results
- Trending information over time provides insight into how Metrics are
  - Improving or Worsening
  - Provides insight into which Metrics requires more attention
  - Color code provide easy graphical whether metric tripped or not
- Percentage results are provided

Attribute	Metric	Test	M	JUN 23	JUL 23	AUG 23	SEP 23	OCT 23	NOV 23
	01	\$ total of discrete material CA/WP ACWPcum where ACWPcum > 0 and BCWPcum <= 0		0.7 %	0.5 %	0.4 %	0.4 %	0.4 %	0.4 %
	02	\$ total of discrete material CA/WP BCWPcum where BCWPcum > 0 and ACWPcum <= 0		0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
H.01.	03	\$ total of discrete material CA/WP BCWPCur where BCWPCur > 0 and ACWPCur <= 0		0.0 %	0.9 %	0.9 %	0.0 %	0.9 %	40.1 %
	04	\$ total of discrete material CA/WP ACWPCur where ACWPCur > 0 and BCWPCur <= 0		42.8 %	2.3 %	12.0 %	27.6 %	5.1 %	2.3 %
	05	\$ total of complete discrete material CA/WP abs ACWPCur where ACWPCur <> 0 and BCWPCur <= 0		0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %

The Audit Metric Trend Report provides up to 6 period of Metric results. It is very useful trending information to see if certain key metrics are improving or worsening over time. In the interest of making the report compact, the values are the calculated percent of the Value/Total, or Numerator/Denominator values for each metric. If you desire to see the detail value you will need to open the Period data and look the single period Audit Metric report.

The reports shows the monthly period of data on the top starting from the latest on the right moving backwards to the left. The test and description are the same as the single period report. Each of the period and row have a value and color to designate if the Metric was tripped (non green) and if it failed the threshold (red).

This reports works by contract level only, meaning that it will only show the current contract. However, if you desire to look at a group of Contracts, then the Empower Sum (Summary Element) will need to executed and then make Sum at the Active Element. The report will generate data from all the “summed value” or multiple contracts that it summed.



## BAC Changes Trending Report

- BAC Change reports is perfect report to cross check MR/UB Chart
- It will show increase in BAC (Green) and decrease (Red)
- This report can drill down to any level you desire, in this case to level 4
- Use to investigate Change Control compliance concerns

WBS	DESCRIPTION	LL	LVL	MAR 20	APR 20	MAY 20	JUN 20
01.09.02.01	Utility Shift Other Project Costs		4	0	0	0	0
01.09			4	-345,172	235,380	-80,679	-133,942
01.09	(RB)		4	-340,795	50,080	-71,818	34,236
01.09			4	-221,104	-55,946	279,674	37
01.09			4	898	-306,774	6,774	307,330
01.09			4	0	0	0	212
01.09			4	0	0	-0	0
01.09			4	-100,543	959	-866	1,583
01.09			4	12	-12	0	-0
01.09	Closeout		4	0	0	0	0
01.09			4	-1,661,181	-194,118	-246,657	-104,120
01.09			4	783,708	-502,844	111,667	98,868

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Use this report while investigating G. Change Control compliance concerns. Augment your traces in the CCB Log and the BAC Change Report as well as the MR/UB Chart.



## Checks on Learning – Validating Metrics

1. What are the possible ways to use the Export Audit Matrix file ?
  - A. Conduct pivots in Excel by CAM or WBS
  - B. Identify what UID have failed
  - C. No need to use Excel, we have PARS data
  - D. Answers A and B are correct
  - E. All are correct
  
2. What are the ways to validate the Metric Test results?
  - A. Use the various views that DOE has created
  - B. Use the Charts and Report to further investigate
  - C. Use the Export Audit Metrics to supplement using Excel
  - D. Use the Gantt Chart to find Activities with issues
  - E. All are correct