ONTARIO POWER GENERATION

Guideline

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Title:
PROJECT SCHEDULING GUIDE

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PROJECT SCHEDULING GUIDE

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2020-08-15
Project ID: N/A

Internal Use Only

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Revision Summary

Revision Number	Date	Comments
R003	2020-08-15	Added back the definitions of refurb schedule baseline Rev. A/B/C/0. Added back the WBS diagram for Functional Work as Attachment F Revised Appendix G; Basis of Schedule
R002	2019-09-15	Revised to (1) add General Requirements to OPG Contractor's Level 3 Scheduling as Appendix A; (2) add instructions for Cost Account assignment for RG projects that are using RG Code of Accounts in EcoSys which is different from Project WBS.
R001	2019-07-31	Revised to (1) include strategic projects; (2) include *Schedule Acceptance*; (3) add *Earning Rule for Vendor's Manufacturing/Fabrication*; (4) add *N-MAN-00120-10001-SCH-11* as Reference 5; (5) more detailed instructions on L2 resource updating for forecasting purpose; (6) include *Basis of Schedule* as Appendix F; (7) include all EPC projects in Appendix B and Appendix C; (8) refine the *weights* in Appendix I for the Earning Rules.
R000	2019-03-31	Initial issue.

1.0 DIRECTION

The objective of this document is to provide detailed guidance to assist OPG and vendor schedulers on understanding the requirements for project schedule development, maintenance and control within scheduling software Primavera P6 (hereafter referred to as P6). This guide is applicable to all project schedules developed in P6 in accordance with the Project Management Standard [R1] and Scalable Project Delivery Model [R2] (including vendor schedules), and also is used in the development of schedules for Strategic Projects/Programs.

This document should be used in conjunction with the Project Schedule Management [R3] and the schedule desktop guides available on the Enterprise Project Management website, such as Schedule Development [R4].

Elements of this guide including work breakdown structure (WBS), WBS and activity ID numbering nomenclature, earned value management, and mandatory codes should be applied when the schedule is in OPG P6 instance or when the schedule is in the vendor's own P6 instance, or in other software such as MS Project.

Projects that have interfaces with Station, should also follow the relevant Station work control governance. Particularly, for Darlington Nuclear Refurb Projects, please also refer to Schedule Management Plan for Integrated Level 3 Execution [R5].

When awarding any contract to a Vendor and when the project needs a schedule, the *General Requirements to OPG Contractor's Level 3 Scheduling* shall be included in the contract package as the clauses for scheduling. Please refer to Appendix A.

1.1 Assumptions

This guide assumes that the scheduler has a basic level of understanding of P6. Schedulers who plan work for OPG projects should:

(a) Have knowledge and working experience of multi-layer scheduling and multi-level scheduling within an engineering, procurement and construction (EPC) environment.

(b) Have working experience of P6, including critical path method (CPM), WBS and WBS summary activities, resource assignment and activity codes.

(c) Have knowledge of managing earned value and work quantities/commodities in P6.

(d) Have a good understanding of project management principles and governance associated with project management.

(e) Have completed the OPG Computer Based Training PEL 71096– INTRODUCTION TO PROJECT PLANNING & CONTROLS SCHEDULING – CAL.

2.0 NEW SCHEDULE DEVELOPMENT

2.1 Login and User Preference Settings

The objective of this section is to provide instructions on P6 Log in and User Preference settings, so that different P6 users will see standard P6 layouts and reports.

2.1.1 Login to P6 by selecting the appropriate database and log in to P6 with the scheduler's OPG Lan User name and password.

If the project is for Darlington Nuclear Refurbishment, please log in to Database: *P6R178_Prod_NR*; if not, then log in to Database: *P6R178_Prod_EP*.

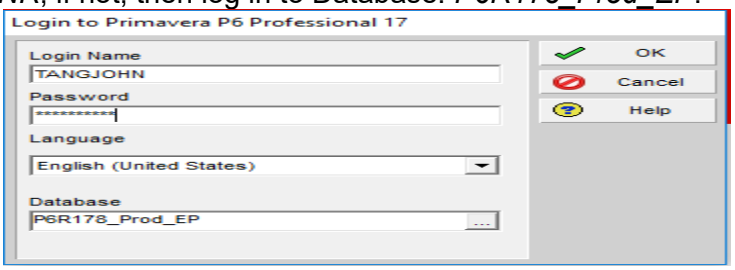


Figure 2-1: Login

2.1.2 Establish the following **User Preference** settings to enable consistency in schedule layouts and reports. Note: Other options may be used for specific purposes, temporarily. E.g. time units may be set to minutes rather than dates for printing daily Level 3 Activities.

Time Units:

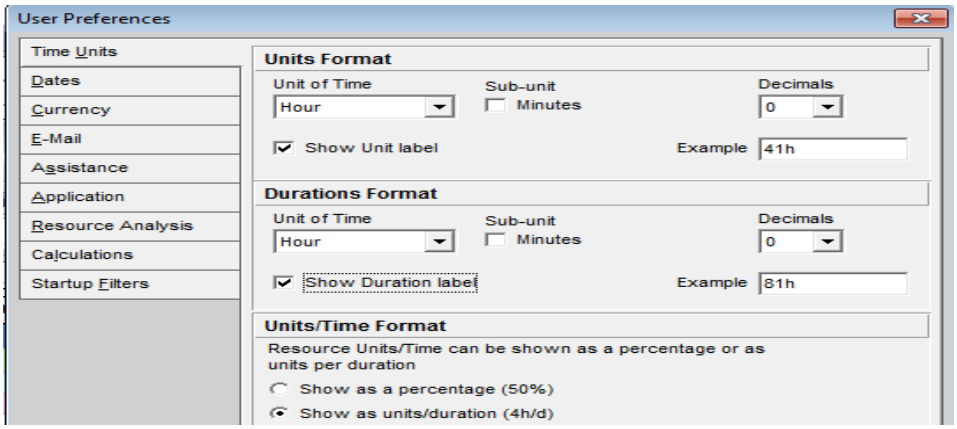


Figure 2-2: Time Units

Dates:

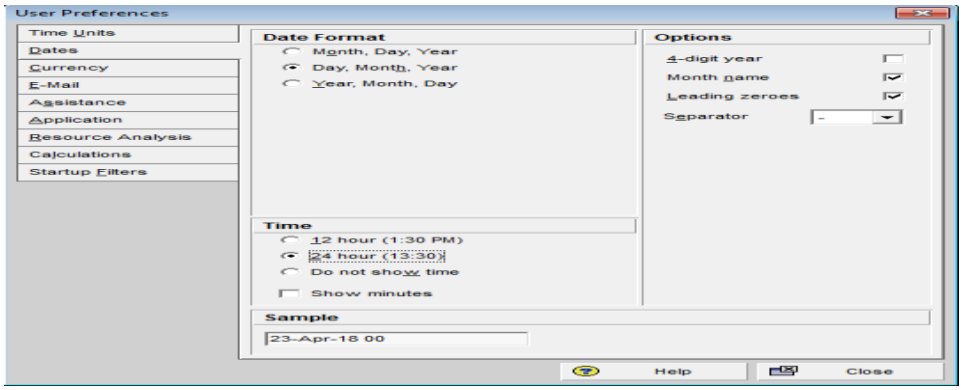


Figure 2-3: Dates

Currency:

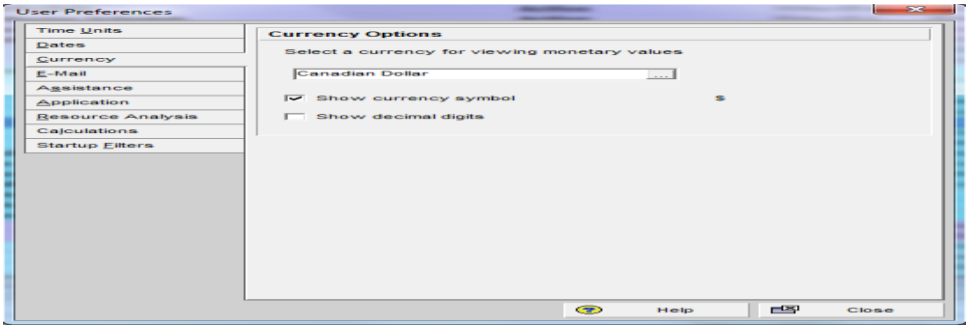


Figure 2-4: Currency

Email:

P6 email is not configured.

Assistance:

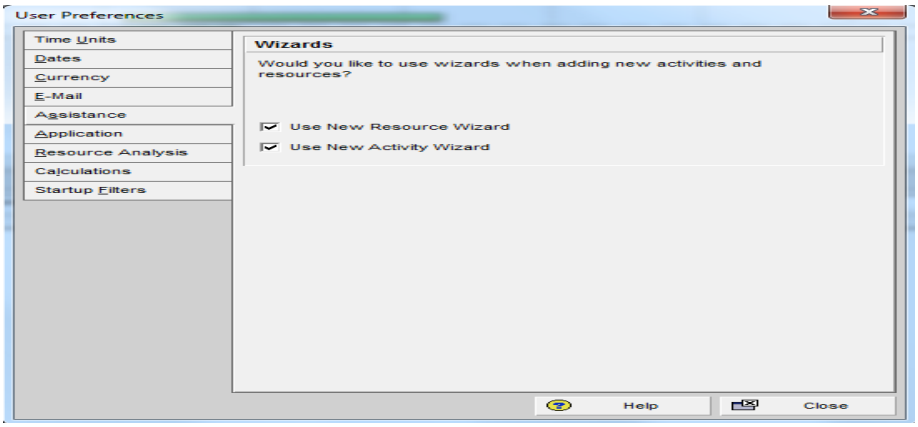


Figure 2-5: Assistance

Application:

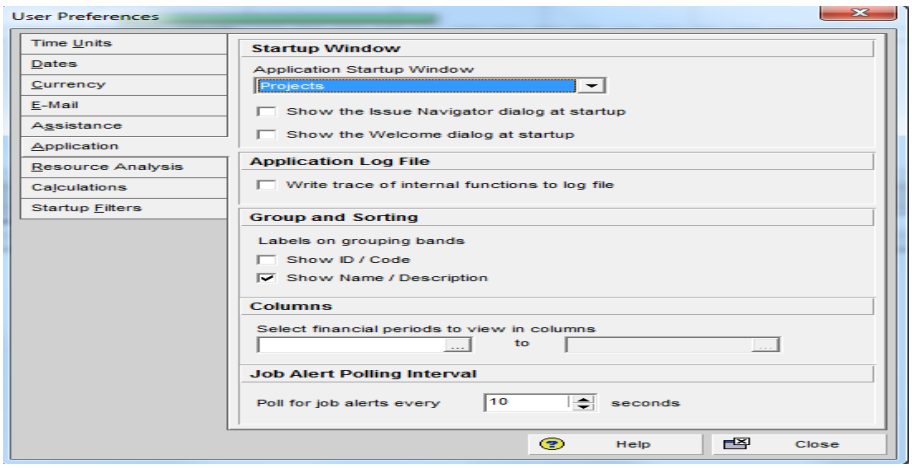


Figure 2-6: Application

Resource Analysis:

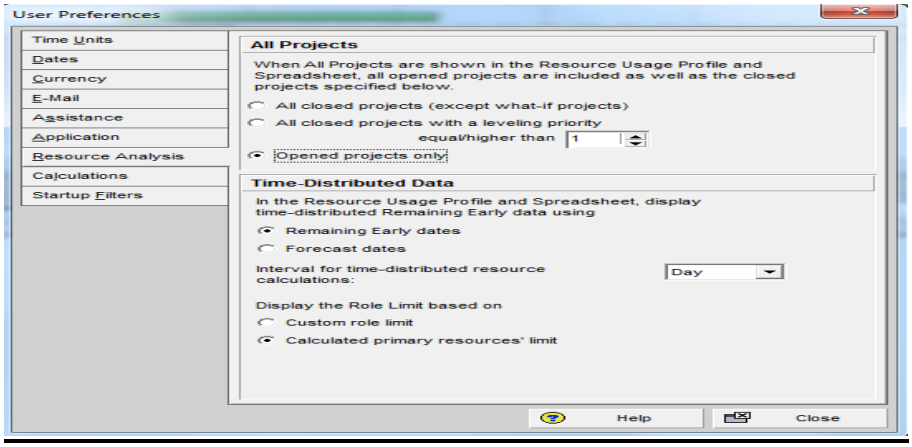


Figure 2-7: Resource Analysis

Calculations:

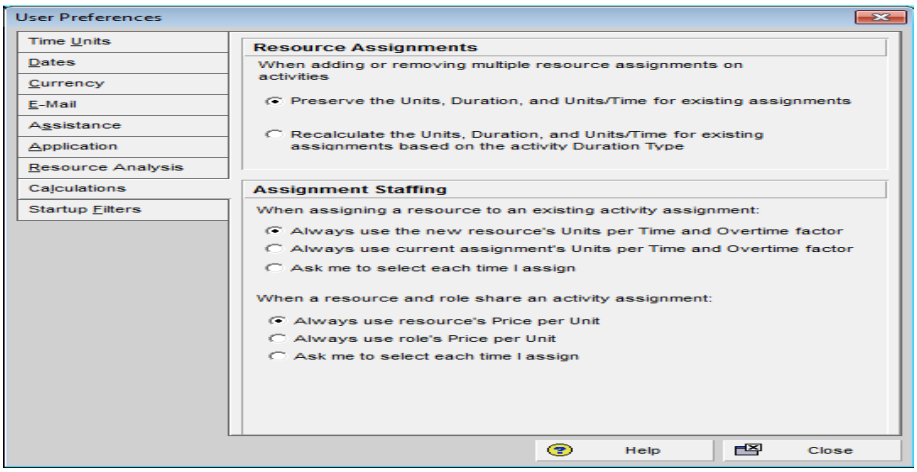


Figure 2-8: Calculations

Start-up Filters:

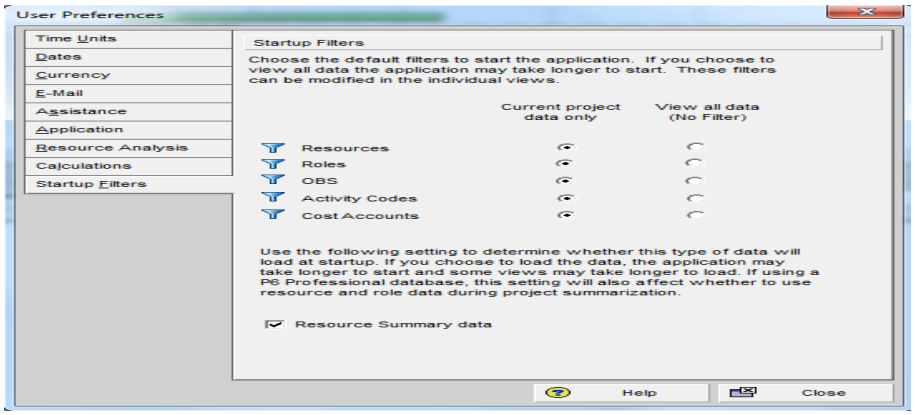


Figure 2-9:Start-up Filters

2.2 Project Creation and Default Settings

This objective of this section is to provide instructions on creating new schedule files and on the default settings.

2.2.1 New schedules within OPG P6 should be developed in accordance with the following:

(a) OPG P6 Administrator should create new schedules in OPG P6 database, and establish the default settings, e.g., project start, project finish, default calendar, completion percentage type, activity ID, earned value calculation setting, etc.

(b) Schedule should be created and developed below the EPS Plan Node. When approved by the EPMO Scheduling Manager or Section Manager, the schedule will be moved to below the Production Node.

2.2.2 The **Project ID** should follow the program WBS path, and aligned with Enterprise Project List (EPL). The **Project Name** should be concise and clearly reflect the Scope of Work (SoW) of the project. Uncommon abbreviations should not be used in project names.

Below are some examples of level 3 schedules:

Project ID	Project Name	Project Status
ISL_L3	Unit Islanding Bundle	Active
ISL_OPG	Islanding Project Bundle Oversight & Integration (73455/73456/73457/73458/73459)	Active
ISL_BH	Bulkhead Containment - Contract A (73460/73462/73461/73463/73464)	Active
ISL_BA	Barrier Project - Contract FOX (73465/73466/73467/73468/73469)	Active
ISL_PR	Pre-Req Modifications Project (73470/73471/73472/73475/73476)	Active
ISL_CBM	Outage Mod 1: Containment Button-Up Modifications (73480-73484)	Active
NR.IL.OT.05.U0.73480	73480 - U0 - Containment Button - Up Modifications Project	Active
NR.IL.OT.05.U2.73482	73482 - U2 - Containment Button - Up Modifications Project	Active
NR.IL.OT.05.U1.73481	73481 - U1 - Containment Button - Up Modifications Project	Planned
NR.IL.OT.05.U3.73483	73483 - U3 - Containment Button - Up Modifications Project	Planned
NR.IL.OT.05.U4.73484	73484 - U4 - Containment Button - Up Modifications Project	Planned
ISL_ALV	Outage Mod 2: Airlock Alterations (73490-73494)	Active

Figure 3-1: Examples of Project ID and Name

2.2.3 The following project **defaults** should be applied:

- ***Duration Type:*** Fixed Duration & Units
- ***Percent Complete Type:*** Physical
- ***Activity Type:*** Task Dependent
- ***Calendar:*** Vendor schedules can be different from the Global Default Calendar

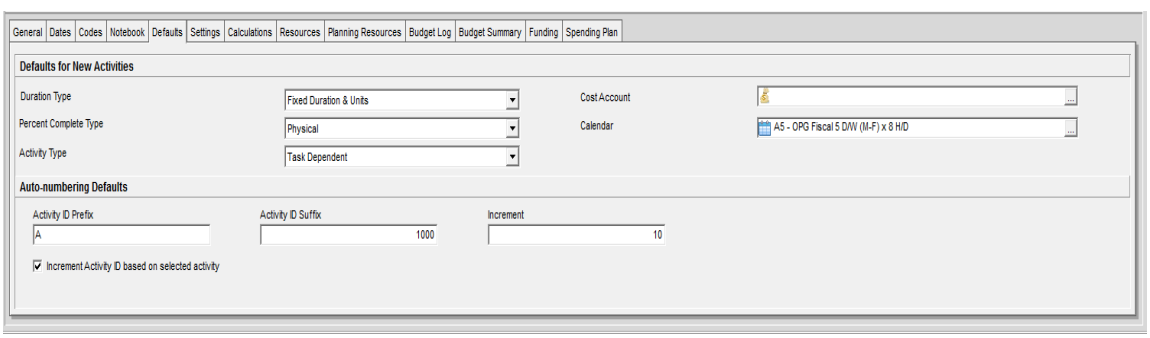


Figure 3-2: Project Defaults

Note that the default settings are not the only choice to be used when developing activities. For example:

- All milestones should use ***Duration as Percent Completion Type***, rather than **Physical.**
- ***WBS Summary Activities*** are used in schedules. In vendor level 3 schedules, Work Packages (Level 2 Activities) and Control Accounts (Level 1 Activities) are ***WBS Summary Activities.***
- ***LOE Type Activities*** are not allowed to be used as they are easy to collapse and consequently zero out the resources.

2.2.4 The following project **settings** should be applied:

- ***Project Baseline*** should be checked for earned value calculations.
- ***Critical Activities*** are defined as **Total Float less than or equal to 20h**

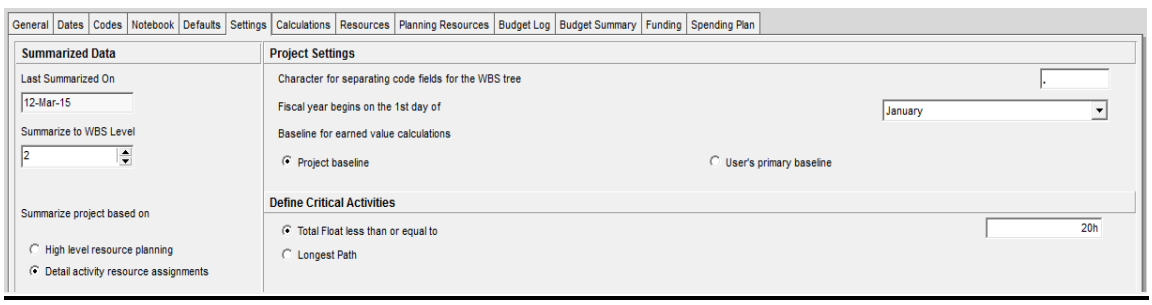


Figure 3-3: Project Settings

2.2.5 The following project **calculation** settings should be applied:

- <u>Uncheck</u> ***Recalculate Actual Units and Cost when duration % complete changes*** to avoid automatically updating the resource units and cost when duration % complete changes.
- <u>Check</u> ***Update units when costs change on resource assignment*** to keep the resource units and resource cost aligned by the rate.

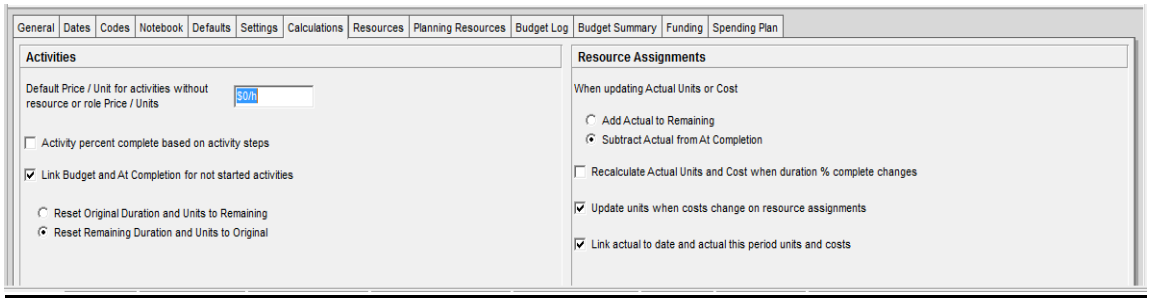


Figure 3-4 (1): Project Calculations

- If ***activity steps*** are used in the schedule, ***Activity percent complete based on activity steps*** should be checked.

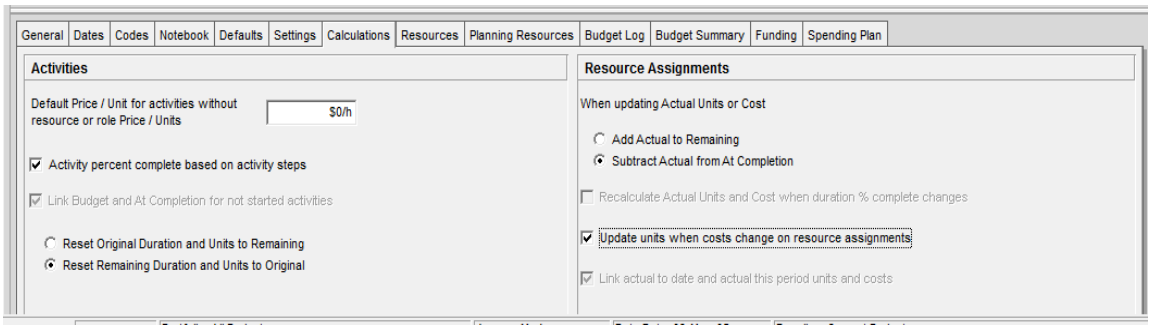
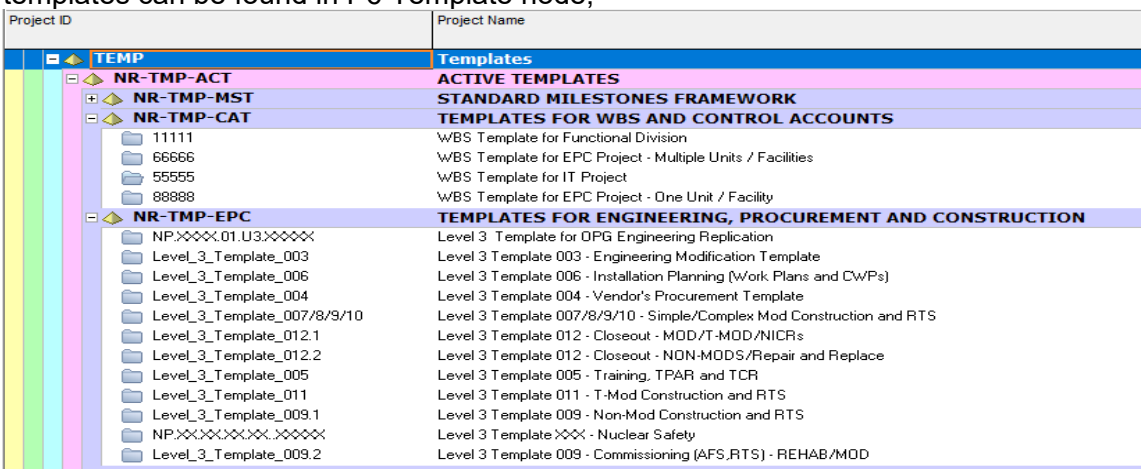


Figure 3-4 (2): Project Calculations

2.3 Project WBS Development

The objective of this section is to provide instructions on developing Project Work Breakdown Structure in P6.

Review the available and relevant P6 schedule templates for applicability. The templates can be found in P6 Template node,



Project ID	Project Name
TEMP	Templates
NR-TMP-ACT	ACTIVE TEMPLATES
NR-TMP-MST	STANDARD MILESTONES FRAMEWORK
NR-TMP-CAT	TEMPLATES FOR WBS AND CONTROL ACCOUNTS
11111	WBS Template for Functional Division
66666	WBS Template for EPC Project - Multiple Units / Facilities
55555	WBS Template for IT Project
88888	WBS Template for EPC Project - One Unit / Facility
NR-TMP-EPC	TEMPLATES FOR ENGINEERING, PROCUREMENT AND CONSTRUCTION
NP.XXXX.01.U3.XXXXX	Level 3 Template for OPG Engineering Replication
Level_3_Template_003	Level 3 Template 003 - Engineering Modification Template
Level_3_Template_006	Level 3 Template 006 - Installation Planning (Work Plans and CWPs)
Level_3_Template_004	Level 3 Template 004 - Vendor's Procurement Template
Level_3_Template_007/8/9/10	Level 3 Template 007/8/9/10 - Simple/Complex Mod Construction and RTS
Level_3_Template_012.1	Level 3 Template 012 - Closeout - MOD/T-MOD/NICRs
Level_3_Template_012.2	Level 3 Template 012 - Closeout - NON-MODS/Repair and Replace
Level_3_Template_005	Level 3 Template 005 - Training, TPAR and TCR
Level_3_Template_011	Level 3 Template 011 - T-Mod Construction and RTS
Level_3_Template_009.1	Level 3 Template 009 - Non-Mod Construction and RTS
NP.XX.XX.XX.XX..XXXXX	Level 3 Template XXX - Nuclear Safety
Level_3_Template_009.2	Level 3 Template 009 - Commissioning (AFS,RTS) - REHAB/MOD

Please see Appendix C, D and E for Standard WBS.

2.3.1 Develop the WBS in accordance with the Project Scope Management [R5] and the specific project scope document, such as the Project Business Case Summary (BCS). The primary requirements of the WBS development in P6 are:

- **WBS Owner** is the OPG project manager. The WBS should be developed during scope definition and before developing activities, by the project team, and approved by the OPG Project Manager and reviewed by EPMO/BU Scheduling Manager as required.
- **WBS Levels** should include project, Scope Category, Control Account and Work Package.
- **WBS Code** should follow the naming convention.
- **WBS Categories** should be assigned with a value if the project construction work is in a nuclear station. It is used for grouping WBS components for outages or innages
- **WBS Names** should be concise and clearly reflect the SOW, and also be able to stand alone to describe the deliverable with minimal acronyms.

- **Control Accounts and Work Packages** should meet the requirements described in the Project Scope Management [R6].

2.3.2 Standard control accounts have been established as follows for (1) EPC Projects and (2) IT Projects. Not all the Control Accounts may be applicable to every project.

Scope Category 0: Cost Only		
0X100	*Defined by Project Manager*	
0X500	*Expenses*	Cost for expenses that are not allocated to specific Work Packages
0X700	*Interest*	Cost for interest
0X900	*Contingency*	Cost for contingency
Scope Category 1: Project Management		
1X100	*Project Management*	Work setting up the strategies and plans for Project Management, such as PMP, SoW, project integration, Risk Management Plan Development, Risk Assessment, etc.
1X200	*Project Controls*	Project controls work such as, Scheduling, Estimation, Funding Request Development, BCS Development, Alternative Option Decision Making Strategies Development, Gate Documents etc.
1X300	*QA/Health, Safety and Environment*	Work such as Quality Management Plan Development, Industrial Safety Management Plan Development, Regulatory Approval Application Documents Development, etc.
1X400	*Organization / Staffing and Training*	work such as Resource Support Identification, Staffing Management Plan Development, Labor Agreement, Training Management Plan Development, Training, etc.
1X900	*Other Management Deliverables*	Work that cannot be allocated in other management areas.
Scope Category 2: Pre-Construction Inspection (for EPC Project) *or* **User/Client Requirement (for IT Project)**		
2X100	*Pre-Construction Inspections Preparation*	Preparation work for Pre-Construction walk down/inspections, including Work Orders preparation for inspections, etc.
2X200	*Pre-Construction Inspections Execution*	Pre-Construction walk down, inspection execution and reports. Site work on different Units may be in different Control Accounts.
20100	*Client/User Requirement - Software*	For IT Project only
20200	*Client/User Requirement - Hardware*	For IT Project Only

20300	*BCS Preparation*	For IT Project Only
Scope Category 3: Engineering (for EPC Project) *or* **System Design (for IT Project)**		
3X100	Engineering Analysis/Technology and SOW Development	Including engineering analysis, technology development, Scope of Work development, conceptual design and specifications, etc.
3X200	OPG Engineering Oversight and Support	For OPG Engineering Level of Effort, such as engineering reviews, oversight and approvals, execution engineering support, commissioning support, design closeout support, etc.
3X300	Preliminary Engineering	Including Engineering Mobilization and Preliminary Design.
3X400	Detailed Engineering including Detailed Design	Including Detailed Design, Design Approval and DCAVR work.
3X500	Field Engineering and Engineering Support during Construction	Mainly refers to Field Engineering and Engineering Support during Construction.
3X600	Other Engineering Deliverables	Refers to other Engineering Deliverables.
3X700	Work Plan Development	Including Comprehensive Work Packages, Construction Plans, Specifications and Commissioning Plans, etc.
3X800	Modification Training and Specialty Training	Refers to the training work to OPG staff after Vendor performs a modification.
3X900	TPAR/TCR and Other Procedure Change	TCR refers to the work for Temporary Change Record; TPAR refers to the work for Technical Procedure Action Request, and other Procedure Changes.
30100	Initial Software Design	For IT Project Only
30200	Final Software Design	For IT Project Only
30300	Initial Hardware Design	For IT Project Only
30400	Final Hardware Design	For IT Project Only
Scope Category 4: Procurement		
4X100	*OPG Commercial Strategies*	The development and approval of commercial strategies.
4X200	*OPG Procurement*	For OPG to issue RFP's, negotiate and award the contracts.
4X300	*OPG Contract Management*	For OPG Contract Management level of effort.
4X400	*OPG Materials and*	For OPG large components acceptance and warehouse

	Tools Receiving and Storage Management	management efforts.
4X500	*Procurement for Long Lead Packages*	EPC Contractor's Purchase Orders shall be identified as Work Packages below this Control Account.
4X600	*Procurement for Non Long Lead Packages*	EPC Contractor's Purchase Orders shall be identified as Work Packages below this Control Account.
4X700	*Manufacturing / Fabrications*	If EPC Contractor needs to manufacture / pre-fabricate equipment or components.
4X800	*Packaging / Shipment and Delivery to OPG Site*	Contractor's packaging, shipment and delivery to OPG Site. Below this Control Account, Delivery Work Packages are identified. Delivery work can be included in Procurement Packages or Manufacturing / Fabrication Packages, if the Delivery work is immediately after the procurement or manufacturing.
40100	*OPG Procurement*	*For IT Project Only*
40200	*Vendor Procurement*	*For IT Project Only*

Scope Category 5: Construction

The control accounts below Construction vary from project to project, since different projects contain different scopes of work.

Construction work is to be further broken down as per construction phases, areas, systems, subsystems or disciplines, etc., according to (1) the SOW documents, (2) the size, duration, and complexity of the work, (3) the construction strategies and (4) the location, area and discipline.

A construction control account contain work may only for one specific station Unit in one Outage window or Innage window.

The number for Control Account can be from 50100, 50200, to 59900.

50100	*Software Configuration / Development*	For IT Project Only
50200	*Hardware Installation*	For IT Project Only
50300	*Customized User Documentation*	For IT Project Only
50400	*Customized Training Materials*	For IT Project Only

Scope Category 6: Test & Commissioning

Similar with Construction, control accounts below Test & Commissioning vary from project to project.

Test & Commissioning is to be further broken down by phases, areas, systems, subsystems or disciplines, etc. Control Accounts are to be setup at certain levels depending on the size,

duration, complexity of the work, and the strategies of how the project team is going to do the work. Test and Commissioning normally aligns with Construction Packages, or by systems.

For some projects, if Test and Commissioning work is small and is done in parallel with, or immediately after construction work, then Test and Commissioning work can be included in the Construction Work Packages.

A test & commissioning control account should only contain work on one unit and should contain either innage or outage work.

The number for control account can be from 60100, 60200, to 69900.

60100	*Test & Commissioning Plans Development*	For IT Project Only
60200	*QA Instance Testing and Improvement*	For IT Project Only
60300	*System Entering Production*	For IT Project Only
Scope Category 9: Closeout		
9X100	*AFS (Available for Service) Work*	AFS (Available for Service) Work
9X200	*As Built Documents Development*	Including As-Built documents development and submission to the owner.
9X300	*Administration Closure*	Including project team demobilization, large construction machines withdrawing from the site, etc.
9X400	*Contract Closure*	Closing the contract.
9X500	*Handover to Client / Station*	Once project work is finished, components, systems and facilities are handed over to Client/Station, including final inspections and handover document signing.
9X600	*Project Closure*	Including closeout all work, final invoice submission, REIS review, scope closeout, project closure report, and Final Post Implementation Plan Review, etc.
90100	*User Training*	For IT Project Only
90200	*End User Support*	For IT Project Only
90300	*Project Closure*	For IT Project Only

Note:
Within the 5 digit Control Account numbers, for the work below Project Management, Engineering, Procurement and Closeout, the second digit currently marked as “X” may be used to differentiate owners if multiple owners work in the project, and/or differentiate time frames if the work is not continuous, or differentiate releasing gates; otherwise, 0 is used to replace X. For example, if two

Vendors has Detailed Engineering work within the same project number, and both of them have their work in two separate time windows, then 31400, 32400, 33400 and 34400 may be defined.

2.4 Project Level 3 Schedule Development

The objective of this section is to provide instructions on developing a new Level 3 schedule.

2.4.1 Apply the following 10-digit Activity ID nomenclature:

Project Milestones

- Project milestone ID's are named as [Project#]M0010, [Project#]M0020, [Project#]M0030 and so on. Note: [Project#] refers to the 5 digit project number.

Level 1 (Control Account) and Level 2 (Work Packages) Activities

- Activity ID's are to be structured as follows:

	1st – 5th Digit	6th Digit	7th – 8th Digit	9th – 10th Digit
Indication	Project No.	Scope Category No.	Control Account No.	Work Package No.
Range	XXXXX	1-9	01-99	00-99
Values	Project number	Standardized scope categories. 0. Cost Management only 1. Project Management 2. Pre-Outage Inspection 3. Engineering 4. Procurement 5. Construction 6. Test & Commissioning 9. Closeout	Standardized Control Accounts for EPC and IT projects.	**00 :** used for L1 activities that are Control Accounts **01-98:** used for L2 Activities that are Work Packages **99:** used for L2 Activities that are planning packages

Table 3-1: Activity ID Nomenclature

An example of construction Control Accounts and Work Packages for a Unit 2 Steam Generator EPC project is provided in Table 3-2. Note: Only Work Packages in Control Account 7323250700 have been illustrated.

WBS Path in P6	Activity ID	Activity Name	Activity Level	Note
73232.5.01	7323250100	U2 SG Systems Primary Side Handover and Site Prep.	Level 1, CA	Control Accounts are developed by OPG and
73232.5.02	7323250200	U2 SG Divider Plate Leakage Repairs	Level 1, CA	

73232.5.03	7323250300	U2 SG Water Lancing	Level 1, CA	confirmed by the vendor.
73232.5.04	7323250400	U2 SG Access Ports Modification	Level 1, CA	
73232.5.05	7323250500	U2 SG Systems Secondary Side Handover and Site Prep.	Level 1, CA	
73232.5.06	7323250600	U2 SG PHT Pressure and Inventory Control Refurb Work	Level 1, CA	
73232.5.07	7323250700	U2 SG Primary Side Cleaning	Level 1, CA	
73232.5.07.01	-- 7323250701	- U2 SG PSC Site Prep. and Setup	Level 2, WP	
73232.5.07.02	-- 7323250702	- U2 SG#1 Primary Side Cleaning	Level 2, WP	Work Packages are generally developed by the vendor and approved by OPG
73232.5.07.03	-- 7323250703	- U2 SG#2 Primary Side Cleaning	Level 2, WP	
73232.5.07.04	-- 7323250704	- U2 SG#3 Primary Side Cleaning	Level 2, WP	
73232.5.07.05	-- 7323250705	- U2 SG#4 Primary Side Cleaning	Level 2, WP	
73232.5.07.06	-- 7323250706	- U2 SG PSC Final Inspections	Level 2, WP	

Table 3-2: Example Activity ID Nomenclature

Project Level 3 Activities

If the project has no requirement for Station Work Control Integration, then Vendor's Level 3 Schedule can be in Vendor P6, and OPG has no requirement for L3 Activity ID naming.

If the project has requirement for Station Work Control Integration, then L3 Activities follow the naming convention as below.

There are two categories of naming convention for Project Level 3 Activities:

- **Category A - Work Order tasks imported from OMS and AS7**: the naming is Work Order number plus 2 digits for numeric order of the Work Order tasks. For example, 023334201.
- **Category B - Level 3 Activities developed by the project team**: the first five digits are the project number, and the second five digits use letters and/or digit numbers. For example, 73102-XXXXX. This is not a "mandatory" requirement.

2.4.2 Project Milestones Development

2.4.2.1 Develop milestones below the WBS Branch 'M' and group in the first section of the schedule. Milestones should be further divided to Program Milestones / Station Milestones, BCS Milestones, Contractual Milestones, and Other Control Milestones. Note: Vendor's Level 3 Schedules do not need BCS milestones.

For detail, please see Project Standard Milestones [R7].

2.4.2.2 Where the BCS and Contract may have different dates for the same milestone event, two P6 milestones are to be created for the same event in the OPG Schedule.

For example, Project 73666 BCS may require materials delivered to Pickering site before May 15, 2020, while the contract date for this milestone is March 15, 2020. Then 2 Milestones should be created in OPG P6 Schedule as:

- 73666M0040 Materials Delivered to Pickering Site – BCS, MS Date: May 15, 2020

- 73666M0080 Materials Delivered to Pickering Site – Contractual MS Date: March 15, 2020

The BCS milestone 73666M0040 should have a soft constraint such as *No-later- Than*. The contractual milestone is used to link relevant Level 3 activities for calculation. Finish to Start relationship should be built from the contractual milestone to the BCS milestone.

2.4.2.3 Below are other major requirements for milestone development:

- ***Milestones*** can be developed below project management, engineering, procurement or construction phase, etc. These milestones should be coded as *Level 3 Activities and they* are <u>not</u> managed as project milestones and should not be mandatorily constrained.
- All milestones should use ***duration*** as ***completion percentage type***.
- ***Finish milestones*** should have at least one predecessor activity, while ***start milestones*** should have at least one successor activity.
- Except for the project start milestone, project finish milestone, and a minimum number of milestones that have mandatory dates (i.e. use hard constraints), all other project milestones should have no constraints, or only soft constraints (i.e. ***finish on or before*** or ***start on or before***). This enables the identification of negative float on relevant activities and the calculation of anticipation dates.
  - Tier 1, 2 and 3 Milestones use hard constraints.
  - Dates not controlled by the Project use hard constraints, for example, the Station Planned Outage Dates and Outage Preparation Milestone Dates.
  - Payment milestones should NOT have constraints.
- All mandatory activity codes should be assigned to milestones.

2.4.3 Project Activities Development

In addition to the activity ID nomenclature, develop project activities in accordance with the following major requirements:

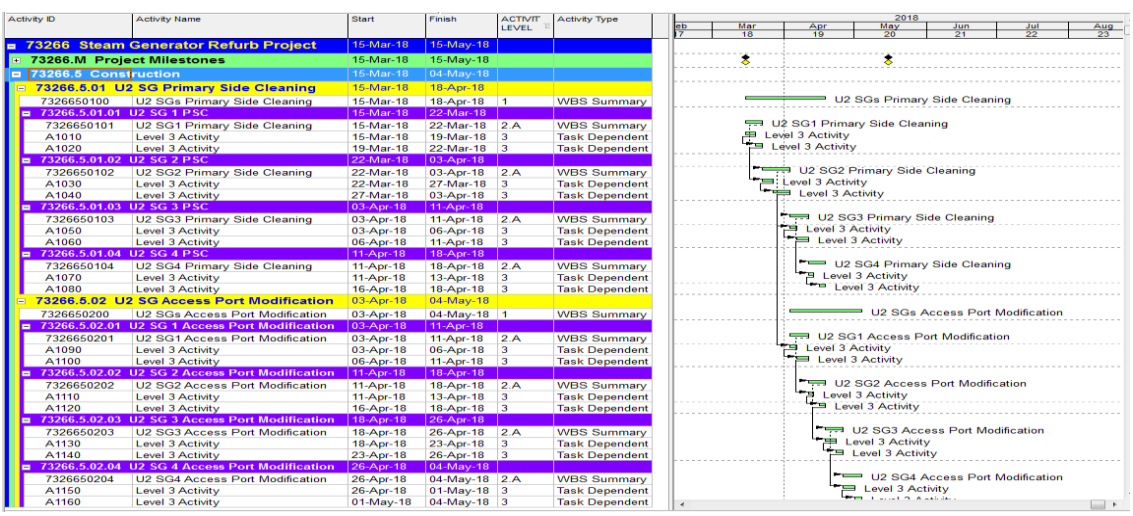
- In project level 3 schedules, Level 1 Activities (Control Accounts) and Level 2 Activities (Work Packages) use ***WBS summary activities***, while Level 3 Activities use *task dependent activities*.
- All activities (including ***WBS summary activities, LOE type activities*** and ***task dependent activities***) should use ***physical*** as ***completion percentage type***. Only milestones use ***duration***.
- Every level 3 activity should belong to one Work Package, and every Work Package should belong to one Control Account.
- Relationships (logic ties) can be developed between Level 3 Activities, or between a milestone and a level 3 activity. All relationship types (SS, FS, FF and SF) are used in P6 Schedules, however 90% of ties should be FS. The use of other relationships (SS, FF and SF) should be avoided unless it is very much required.
- For project that has requirement for Station Work Control Integration, there might be cross project relationships. The schedulers should be aware of the ties coming in and out of his/her area and the potential impact on other projects if work is moved.

- ***Activity steps templates*** should be assigned to relevant Level 2 Activities (Work Packages) as the earning rules for calculating ***physical % complete***. After applying an ***activity steps template*** to a Work Package (level 2 activity), schedulers are allowed to make changes on the ***activity steps*** and the ***weights***.
- All mandatory codes should be assigned to relevant Milestones and Activities. For detail, please refer to Section 2.7, and the Schedule Control Coding [R7].
- Owner obliged activities such as Hold Point, Witness Point, Owner Reviews, and Owner's other supporting activities should be included in Vendor's Level 3 Schedule, but the cost and labor hours of those activities are not in Vendor's Work Packages.
- When developing Level 3 Activities, schedule quality should meet the requirements. For detail, please refer to Appendix B.

When developing Activities, Project Schedule Templates can be found in OPG P6 instance.

Figure 3-5 illustrates the relationship between Control Accounts (Level 1 Activities), Work Packages (Level 2 Activities), and Level 3 Activities.

Appropriate use of control accounts and work packages enable schedule reporting at differing levels. By filtering out and obtaining all control accounts and project milestones a **Project Level 1** Schedule can be generated on one page. By obtaining work packages, a **Project Level 2 Schedule** can be generated.
Note: If control account or work package durations are too long, the schedule will not provide adequate level of detail to control and monitor.



Activity ID	Activity Name	Start	Finish	ACTIVIT LEVEL	Activity Type
73266 Steam Generator Refurb Project		15-Mar-18	15-May-18		
73266.M Project Milestones		15-Mar-18	15-May-18		
73266.5 Construction		15-Mar-18	04-May-18		
73266.5.01 U2 SG Primary Side Cleaning		15-Mar-18	18-Apr-18		
7326650100	U2 SGs Primary Side Cleaning	15-Mar-18	18-Apr-18	1	WBS Summary
73266.5.01.01 U2 SG 1 PSC		15-Mar-18	22-Mar-18		
7326650101	U2 SG1 Primary Side Cleaning	15-Mar-18	22-Mar-18	2.A	WBS Summary
A1010	Level 3 Activity	15-Mar-18	19-Mar-18	3	Task Dependent
A1020	Level 3 Activity	19-Mar-18	22-Mar-18	3	Task Dependent
73266.5.01.02 U2 SG 2 PSC		22-Mar-18	03-Apr-18		
7326650102	U2 SG2 Primary Side Cleaning	22-Mar-18	03-Apr-18	2.A	WBS Summary
A1030	Level 3 Activity	22-Mar-18	27-Mar-18	3	Task Dependent
A1040	Level 3 Activity	27-Mar-18	03-Apr-18	3	Task Dependent
73266.5.01.03 U2 SG 3 PSC		03-Apr-18	11-Apr-18		
7326650103	U2 SG3 Primary Side Cleaning	03-Apr-18	11-Apr-18	2.A	WBS Summary
A1050	Level 3 Activity	03-Apr-18	06-Apr-18	3	Task Dependent
A1060	Level 3 Activity	06-Apr-18	11-Apr-18	3	Task Dependent
73266.5.01.04 U2 SG 4 PSC		11-Apr-18	18-Apr-18		
7326650104	U2 SG4 Primary Side Cleaning	11-Apr-18	18-Apr-18	2.A	WBS Summary
A1070	Level 3 Activity	11-Apr-18	13-Apr-18	3	Task Dependent
A1080	Level 3 Activity	16-Apr-18	18-Apr-18	3	Task Dependent
73266.5.02 U2 SG Access Port Modification		03-Apr-18	04-May-18		
7326650200	U2 SGs Access Port Modification	03-Apr-18	04-May-18	1	WBS Summary
73266.5.02.01 U2 SG 1 Access Port Modification		03-Apr-18	11-Apr-18		
7326650201	U2 SG1 Access Port Modification	03-Apr-18	11-Apr-18	2.A	WBS Summary
A1090	Level 3 Activity	03-Apr-18	06-Apr-18	3	Task Dependent
A1100	Level 3 Activity	06-Apr-18	11-Apr-18	3	Task Dependent
73266.5.02.02 U2 SG 2 Access Port Modification		11-Apr-18	18-Apr-18		
7326650202	U2 SG2 Access Port Modification	11-Apr-18	18-Apr-18	2.A	WBS Summary
A1110	Level 3 Activity	11-Apr-18	13-Apr-18	3	Task Dependent
A1120	Level 3 Activity	16-Apr-18	18-Apr-18	3	Task Dependent
73266.5.02.03 U2 SG 3 Access Port Modification		18-Apr-18	26-Apr-18		
7326650203	U2 SG3 Access Port Modification	18-Apr-18	26-Apr-18	2.A	WBS Summary
A1130	Level 3 Activity	18-Apr-18	23-Apr-18	3	Task Dependent
A1140	Level 3 Activity	23-Apr-18	26-Apr-18	3	Task Dependent
73266.5.02.04 U2 SG 4 Access Port Modification		26-Apr-18	04-May-18		
7326650204	U2 SG4 Access Port Modification	26-Apr-18	04-May-18	2.A	WBS Summary
A1150	Level 3 Activity	26-Apr-18	01-May-18	3	Task Dependent
A1160	Level 3 Activity	01-May-18	04-May-18	3	Task Dependent

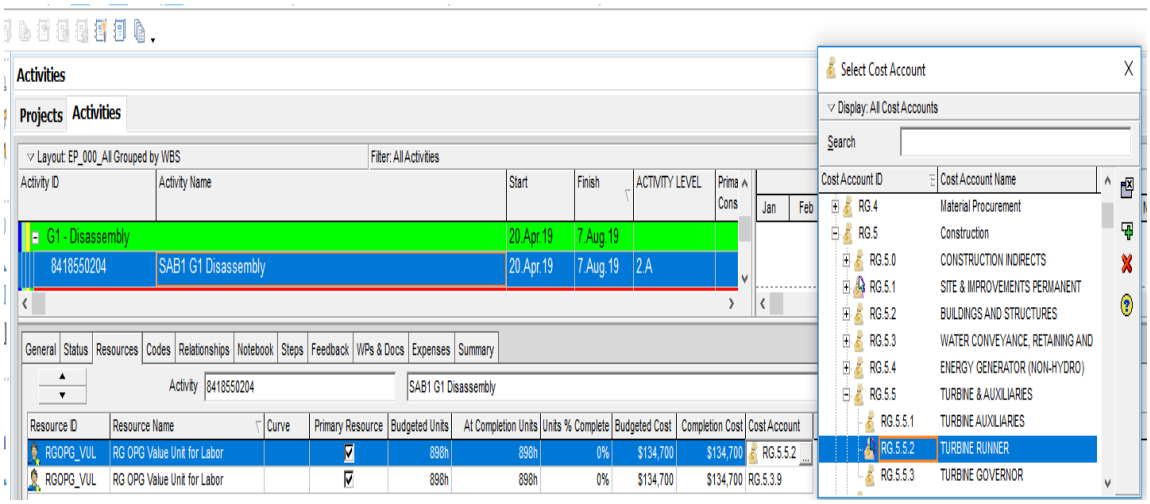
Figure 3-5: Control Accounts, Work Packages, and Level 3 Activities

2.4.4 Resource Loading

2.4.4.1 Resources Breakdown Structure should be established in P6 instance that contains ***Value Units*** and ***Major Work Quantities / Commodities*** to be loaded to Level 2 Activities, and ***Common Resources*** to be loaded to Level 3 Activities.

For detail, refer to Section 7.0 Project Earned Value Management.

2.4.4.2 For Renewable Generation projects that are using ***RG Code of Accounts*** in EcoSys which is different from P6 Work Breakdown Structure, multiple ***Value Unit*** resources can be loaded to the same Work Package, with each Value Unit charging to its relevant ***Cost Account***.



2.4.4.3 Where applicable, load ***Major Work Quantities / Commodities*** to relevant Level 2 Activities (WBS Summary Activities for Work Packages) in Level 3 Schedules, for example, in the diagram below, ***Number of Pressure Tubes to Be Removed***. The ***Resource Type*** of Work Quantities is ***Material***, and there should be no rates for Work Quantity resources. ***Curves*** can be applied when applicable.

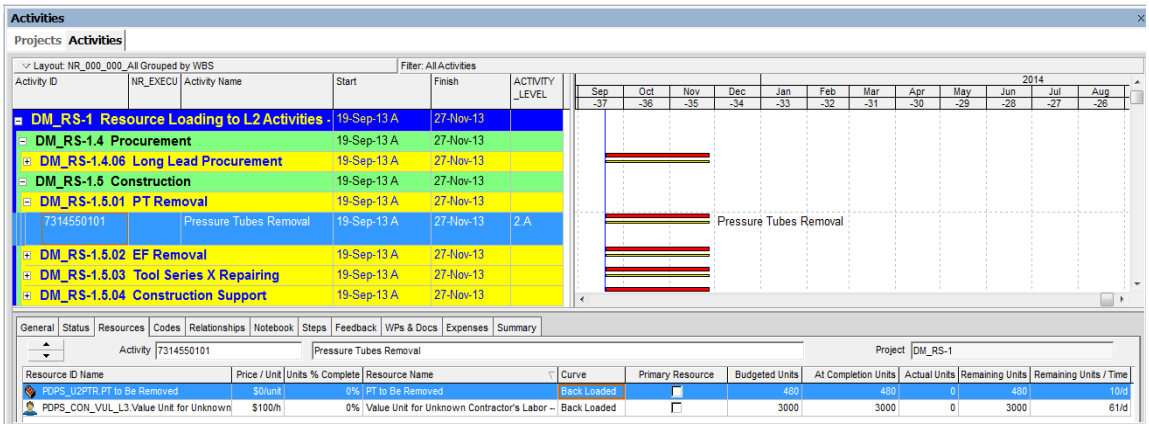


Figure 3-6: Example of Major Work Quantities

2.4.5 Vendors are also required to load common resources such as 'Trades – Boilermakers' to Level 3 Activities. Particularly, it is mandatory to load ***Critical Support Resources*** that need special arrangement or special OPG coordination, such as the cranes and OPG Radiation Protection Support.

2.4.6 After resource loading, ensure:

(a) Planned Start Date = Start Date, and *Planned Finish Date = Finish Date*;

(b) Budgeted Units = At Completion Units = Actual Units + Remaining Units.

2.5 Project Level 2 Schedule Development

This section provides instructions on the development of level 2 Schedules.

2.5.1 For Project level A, B and C Projects, OPG Project Team should develop Project Level 2 schedules. This will form the **Control Schedule** and the basis for all project schedule performance reporting.

2.5.2 The process for developing OPG Level 2 Schedules is the same as Project Level 3 Schedules described in Section 2.4, except that in Level 2 schedules, Level 2 Activities are Task Dependent Activities; while in Level 3 Schedules Level 2 Activities are WBS Summary Activities.

2.5.3 Project Level 2 Schedule should also have ***Value Units, Work Quantities / Commodities*** loaded, and ***Activity Steps*** should be applied to Level 2 Activities where applicable.

2.6 Level 2 and Level 3 Schedule Alignment

This section provides the instructions on the alignment between OPG Level 2 Schedule and Vendor Level 3 Schedules.

2.6.1 For some Projects, multiple contracts are awarded to different vendors. If the project scale is of project level A or project level B, and it has no requirement for Station Work Control Integration, then each Vendor may have a separate Level 3 Schedule in their own P6 instances.

In this case, OPG Project Team should use a Level 2 Control Schedule for project lifecycle scheduling, cost control and reporting. This Level 2 Schedule can contain Level 3 Activities for those Work packages that are OPG self-performing.

For example, Figure 3-7 illustrates the use of an OPG Control Schedule. In this example, OPG maintains the Project Level 2 Control Schedule that contains all Work Packages during the Project lifecycle. Some self-performing packages contain Level 3 Activities.

Level 3 Schedules are maintained by three contractors in their own P6 instances for their specific SOW. The schedules are aligned by using the same WBS Path, Activity IDs and Activity Names for Level 0, Level 1 and Level 2 Activities.

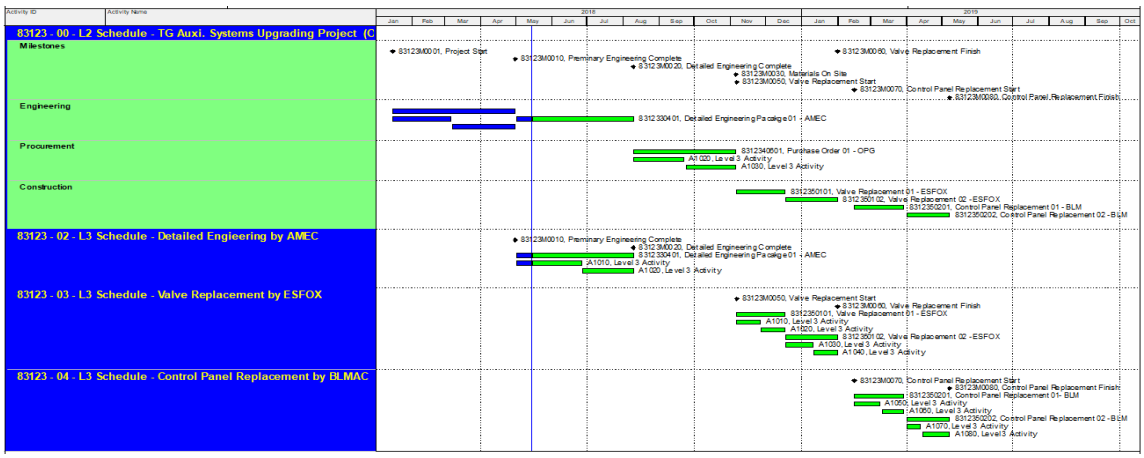


Figure 3-7: OPG Level 2 Control Schedule and Vendor L3 Schedules

2.6.2 In the case that a Vendor's construction work has requirement for Station Work Control Integration, then Vendor and OPG should work together to merge the Vendor's Level 3 Activities into OPG Control Schedule. P6 Access will be given to Vendor to edit the relevant WBS elements at Control Account level.

2.7 Codes Establishment and Codes Assignment

This section provides instructions on codes establishment and codes assignment.

2.7.1 Global level Activity Codes and EPS level Activity Codes should be used as the first priority, rather than creating new Activity Codes at Project level to avoid duplicates.

2.7.2 If new codes are needed, the OPG Scheduling Manager in the EPMO Scheduling Manager will review and approve.

2.7.3 Global level and EPS level Activity Codes (at any EPS level) are administered by the OPG P6 Administrator.

2.7.4 Activity Codes in P6 should be established in a hierarchical structure rather than on a plain list, hence the values of one code should be systematically designed, rather than being added from time to time in a random way.

2.7.5 For Renewable Generation Projects that some of the Projects use *RG Code of Accounts* for cost management in OPG EcoSys that are different from the WBSs in P6 schedules, *P6 Cost Accounts* are established as per the *RG Code of Accounts.*

2.7.6 When the Project has requirement on Station Work Control Integration, the Level 3 Schedule should be in OPG P6 instance. Then relevant mandatory activity codes should be assigned to level 0, level 1, level 2 and level 3 Activities. Refer to the Schedule Control Coding [R8].

2.7.7 When the Project has no requirement on Station Work Control Integration, the Level 3 Schedule will be in Vendor P6 Instance. Then relevant mandatory activity codes should be assigned to level 0, level 1, level 2 Activities Refer to the Schedule Control Coding [R8].

2.8 Schedule Quality Checks

This section provides instructions on schedule quality control.

2.8.1 When developing a Level 2 or Level 3 Schedules, the **US DCMA 14-Point Assessment Criteria** should be used to check the schedule quality and all issues should be resolved or understood. Please refer to Appendix B.

2.8.2 The following three tools should be applied to perform **schedule quality check**, before submitting a Level 2 or Level 3 Schedule for approval, baselining or assigning a maintained baseline:

- **EP_QC Layouts** should be used to identify and clean the quality issues by the scheduler;
- **Delteck Acumen Fuse** should be used in the OPG EPMO and BU PMO;
- **P6 Schedule Implementation Job Aid Checklist** should be applied by the project team. All items must pass or be dispositioned before a schedule can be approved for acceptance. Refer to P6 Schedule Implementation - Job Aid [R9].

- When a Level 3 Schedule is ready for review and acceptance, Project Team should prepare and submit the schedule in required layouts, together with the Job Aid [R9] and Scheduling Basis (Appendix F)

2.9 Schedule Acceptance

This section provides the instructions on the schedule approval and acceptance process.

- Vendor's Level 3 schedule will be concurred by the OPG Project Team, Station Work Control Team, and approved by BU PMO Scheduling Manager.
- OPG Project team to ensure the schedule meets the requirements of the scope, budget and time, etc.
- Station Work Control Team to ensure the schedule meets the requirements of the Station, including work windows, system integrity and safety, etc.
- BU PMO Scheduling Department to ensure the schedule meets requirements of scheduling standards and process.
- Scale Level A and B Project Level 2 Control Schedule will be approved by EPMO Scheduling Manager; Scale Level C and D Project Level 2 Control Schedule is approved by BU PMO Scheduling Manager.

3.0 SCHEDULE BASELINING MANAGEMENT

This section provides instructions on P6 schedule baseline management. Please refer to Schedule Baseline Management [R10].

3.1 Baseline Types and Versions

3.1.1 There are four types of baselines for OPG projects:

- **Project Original Baselines:** include all Gate Approval Baselines. These baselines are for the purpose of project performance measurement. The baseline nomenclature is as follows:

  G1BLNYYYYMMDD – PPPPP – Ux – Project Name

  G stands for Gate, PPPPP stands the Project Number, x stands for the Nuclear Unit number

- **NP_Program_Baselines:** for Outage Management purpose, all projects that have work during Refurb Outages will have Rev.A, Rev.B, Rev.C and Rev.0 Baselines. The baseline nomenclature is as follows:

  REV0BLNYYYYMMDD - PPPPP - Ux – Project Name

  - **Rev. A Baseline**: 30 months before the Unit Breaker Open, a new baseline is saved as the Control Version Rev.A.
  - **Rev. B Baseline**: 18 months before the Unit Breaker Open, a new baseline is saved as the Control Version Rev.B.

- **Rev. C Baseline**: 6 Months before the Unit Breaker Open, a new baseline is saved as the Control Version Rev.C.
- **Rev. 0 Baseline:** 1 Month before the Unit Breaker Open, a new baseline is saved as the Control Version Rev.0.

- **Project Control Baseline**: when Change Control is approved, the changes are applied in the Baseline Control Copy, and the Control Copy is used as Project Control Baseline.
- **Schedule_Snapshots:** for specific variance checking purposes, different snapshots are saved in P6 temporarily, including Month End Copy and Week End Copy, etc.

3.1.2 In order not to impact schedule updating and calculation, baseline maintenance is only allowed from Monday to Thursday.

3.2 Baselining Responsibility

3.2.1 EPMO P6 Administrators are responsible to manage baselines and assign P6 Project Baselines for the schedules that are in OPG P6 Instance. Schedulers are responsible for revising baselines once Change Control is approved.

3.2.2 After concurrence by OPG BU Project Manager / BU PMO, a baseline is saved and assigned as the *P6 Project Baseline* by the EPMO P6 Administrator.

3.2.3 All approved Baseline files are rigorously controlled. There should be no baseline changes without appropriate Change Control Form (CCF) as per the Project Integrated Change Control manual [R11].

3.3 Criteria of Re-Baselining and Baseline Maintaining

3.3.1 **Project Re-Baselining** is applied in the situations when the Project have significant changes such that the performance cannot be measured from the baseline i.e., major scope change, contract change or overall project strategy change.

3.3.2 **Project Baseline Maintaining** is used for:

(a) Adding or deleting scope in the Project Baseline file, with budgeted Value Unit; and

(b) Revising Baseline Value Units to align with the Work Packages in the current schedule file.

(c) Date changes to Milestones, Work Packages and Control Accounts.

When maintaining a baseline, the historic data should not be changed.

3.4 Baseline Maintaining Process

3.4.1 Directed Change of Planned Values - Resource Units & Dates

Trigger for directed change of Planned Values will be based on Work Packages only and analyzed at the Control Account level. i.e., if one work package has changes that bring impact to the Control Account, then this could trigger a CCF.

Scenario analysis must be developed to demonstrate the downstream impact of the logic prior to performing the following steps. The process to maintain or modify the baseline is as follows:

- **Step 1:** Copy the Current Schedule together with the Project Control Baseline

P6 Administrator is to copy the Current schedule together with the Project Control Baseline, and paste it in the Plan Node.

Change the status of the copy of the Current schedule to InActive.

Restore the Project Baseline from the copy of the Current schedule in the Plan Node.

- **Step 2:** Add New Work Packages and Level 3 Activities to the Baseline Copy, or Delete Work Packages and Level 3 Activities from the Baseline Copy.

  Based on approved CCF, add activities from the current file into the copy of the baseline for new activities including Level 2 and level 3 activities, or delete activities from the copy of the baseline.

- **Step 3:** Modify the Baseline Copy

  Revise activities within the copy of the baseline to match the current schedule based on the approved CCF.

Note: Baseline is a static file and cannot be calculated, and this is only for performance Baseline.

3.4.2 Directed Change - Milestone Dates Only

Trigger for Contractual obligation changes, Milestones (inclusive of Program milestones) will be based on changes to Tiered milestones only.

- **Step 1**: Copy the Current Schedule together with the Project Control Baseline

  P6 Administrator is to copy the current schedule together with the Project Control Baseline, and paste it in the Plan Node.

  Change the status of the copy of the Current schedule to InActive.

  Restore the Project Baseline from the copy of the Current schedule in the Plan Node.

- **Step 2:** Add New Milestones & Change the Baseline Copy

  Revise the relevant Millstone dates, or add, or delete milestones as per the approved CCF.

  Changing Tiered Milestones can only be done with approved CCF.

3.4.3 Project Baseline Assignment

- Project Team (Project Lead or CSA) to confirm the CCF is approved.
- Project Team to request Baseline Change approval from BU PMO Scheduling Manager with the approved CCF, a summary of the major changes, together with the CCF Attachment 2 that list all Milestones and Work Packages that have changes for dates or Labor Hours.
- Project Lead or CSA to inform EPMO P6 Administrator to change the Project Baseline.
- P6 Administrator to validate the Baseline changes are in alignment with CCF, and verify BI Tool Check-in.
- P6 Administrator to inform Project Lead and CSA to verify in P6 for the Baseline change.
- CSA to verify the baseline assignment and confirm the baseline data (budgets and dates) are correct.

- If there are no issues, the Baseline change is complete.

4.0 SCHEDULE UPDATING AND CALCULATION

This section provides instructions on schedule updating and calculation.

4.1 Updating Cycle and Data Date Control

4.1.1 The Project Level 2 Schedule should be updated and calculated as a minimum on a monthly basis. The Data Date is on the Thursday of the Month End, at 8:00am, or according to the requirement of the OPG EPMO Scheduling Manager.

Project Level 3 Schedule should be updated and calculated as a minimum on a weekly basis, and the Data Date is on every Thursday morning at 8:00am.

Please refer to Cost and Schedule Month-End Checklist [R12] for the Level 3 Schedule WEEKLY Update Quality Checks and the Level 2 Schedule Updating instructions.

4.1.2 If the Project has requirement on Station Work Control Integration, during execution period, the Multi-Layer Schedule should be updated and calculated on a daily basis at 8:00am. Requirements from Station Work Control Should be followed for program integrated calculation.

4.2 Activity Updating

4.2.1 Milestones in WBS Branch M

- Actualize Milestones if started or finished.
- Future Milestones are revised when needed. Changes on the constrained Milestones need approval from Project Manager.
- Changes are implemented only in the current Schedule, rather than in the baseline file.

4.2.2 Level 3 Activities

- Actualize ***Start Dates*** and/or ***Finish Dates*** if started or finished.
- Setup ***Expected Finish Dates*** for all In-Progress Activities; or adjust the ***Finish Dates*** after ***scheduling (F9)*** and do ***scheduling*** again.
- For all finished Activities, manually update ***Physical % Complete = 100%*** and update ***Actual Units = Budgeted Units = At Completion Units***.
- For In-Progress Activities, update ***Physical % Complete*** only for long duration (over 1 week) Level 3 Activities; for Level 3 Activities less than 1 week, the ***Physical % Complete*** is either 0%, or 100% when finished.
- Future activities and logic relationships are revised when necessary.

4.2.3 Level 2 Activities

- If ***Activity Steps*** are applied, actualize relevant ***Activity Steps***. If a ***Step*** is partially finished, a percentage can be applied to ***Step % Complete*** as illustrated in Figure 5-1.

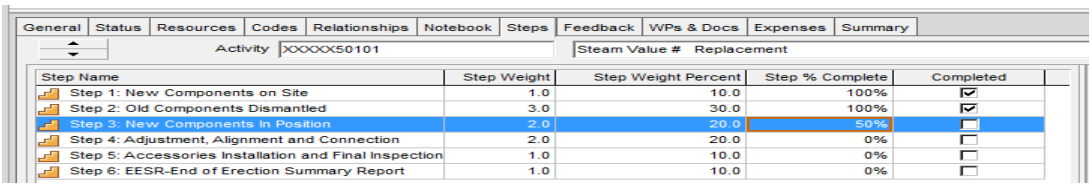


Figure 5-1: Activity Step % Complete

Note: P6 will automatically update the ***Physical %*** based on calculation of ***Step Weight*** and ***Step % Complete*** actualized.

- If ***Activity Steps*** are not applied on the Level 2 Activity, manually update ***Physical %*** based on the earning rules as illustrated in Figure 5-2.

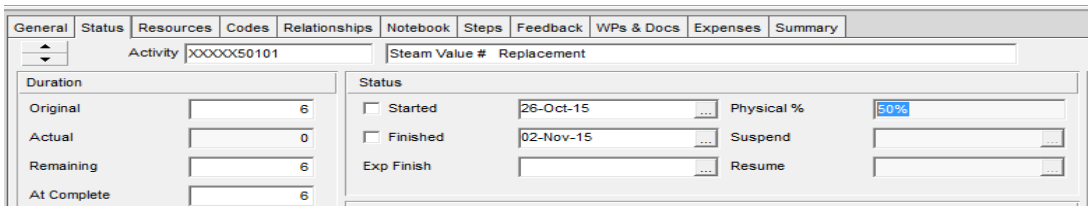


Figure 5-2: Level 2 Activity Physical %

- ***Start Date*** and ***Finish Date*** do not need updating since Level 2 Activities are *WBS Summary Activities* in Level 3 Schedule *as* illustrated in Figure 5-3.

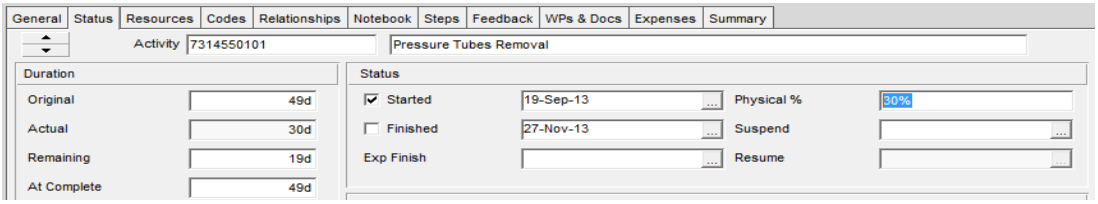


Figure 5-3: Level 2 Activity Start and Finish Date

4.2.4 Level 1 Activities

- No updating is needed for Level 1 Activities since Level 1 Activities are *WBS Summary Activities* in Level 2 or Level 3 Schedule, and there is no resources loaded.

4.3 Resource Updating

Please note in OPG P6 schedules, ***Actual Units*** refers to ***Actual Units Earned***, not ***Actual Units Spent*** or ***Consumed.***

4.3.1 For Level 3 Activities Resource Updating

- For completed Activities, update ***Actual Units = Budgeted Units = At Completion Units***.
- For In-Progress Activities, update ***Resources***, including ***Budgeted Units***, ***Actual Units*** and ***Remaining Unit***, as per the following steps.
  - Update ***Actual Units = 0***.
  - Update ***Budgeted Units*** = new estimate of the resource need if there is change, and the new estimate includes Actual Units and Remaining Units.

- Confirm ***At Completion Units = Budgeted Units = Actual Units + Remaining Units***.
- Update ***Units % Complete = Physical % Complete*** only for long duration Level 3 Activities (more than 1 week).

4.3.2 For **Level 2 Activities Resource Updating**

- Update ***Budgeted Units*** = new estimate of the resource need if there is change, and the new estimate includes Actual Units and Remaining Units, and please confirm Budgeted Units = At Completion Units = Actual Units + Remaining Units
- For completed Activities, update ***Actual Units = Budgeted Units = At Completion Units.***
- For In-Progress Activities, please see the detailed steps in *Section 7.6 Schedule Updating for Earned the Values*.

4.4 Multi-Level Schedules Updating

Once Vendors finish the periodic updating of Level 3 Schedules, there are two options for OPG scheduler to update the Level 2 Control Schedule.

- Vendor submits PDF Schedule Progress Reports in OPG pre-defined format, including (1) Project Milestones Dates (Level 0 Activities below WBS Branch M), (2) Start and Finish Date and Physical Completion Percentages of all Level 2 Activities, and (3) Start and Finish Date of all Level 1 Activities. Based on Vendor's Schedule Progress Reports, OPG Scheduler is to manually update the Level 2 Control Schedule. There are three major reports,
  - **Project Lifecycle Schedule Progress Report**: including Level 0/1/2 activities, with reporting layout columns as Activity ID, Activity Name, Baseline Start Date, Baseline Finish Date, Start Date, Finish Date, Baseline Labor Hours, Remaining Labor Hours, At Completion Labor Hours, Planned Value Hours, Earned Value Labor Hours, SPI-Labor, SV-Labor, Physical % Complete, Units % Complete, etc. Earned Value Management S-Curves should be shown at the bottom of the layout. Please see Appendix G: Project Lifecycle Schedule Progress Report.
  - **Project Three Months Look Ahead Schedule:** including Level 0/2/3 Activities from current date minus 2 weeks to current date plus 12 weeks, with layout columns as Activity ID, Activity Name, Start, Baseline Start, Finish, Baseline Finish, Total Float, Variance BL Finish, CM_Vendor, etc., Stacked Resource Histogram should be shown at the bottom of the layout. Please see Appendix H: Project Three Months Look Ahead Schedule.
- Vendor exports the P6 Schedule into MS Excel file with OPG pre-defined format, then OPG P6 Administrator imports the MS Excel file into P6 to facilitate Level 2 Schedule updating by OPG Schedulers.

4.5 Schedule Calculation (F9) and Progress Analysis

4.5.1 When ***scheduling***, *Schedule Options* are defined as follows:

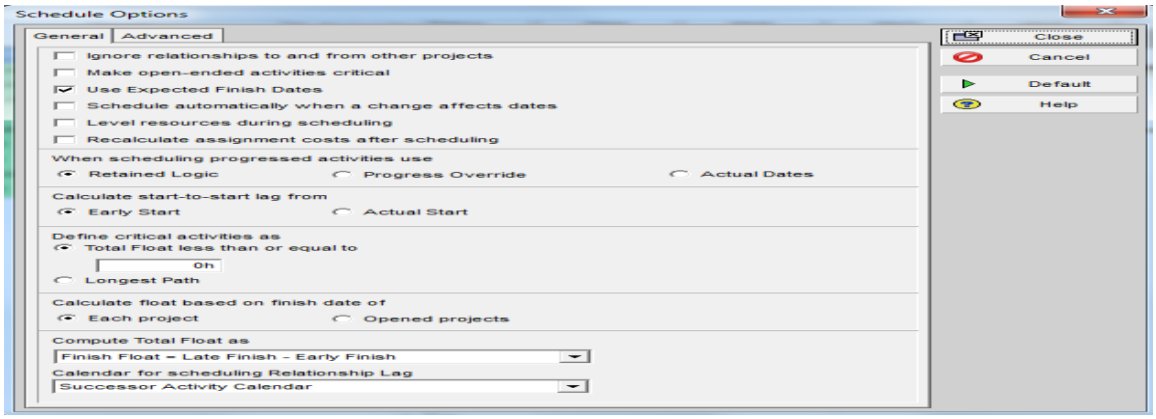


Figure 5-5: Schedule Options when Scheduling

4.5.2 After ***Scheduling*** (F9), select ***View Log*** and fix all issues identified by P6 scheduling.

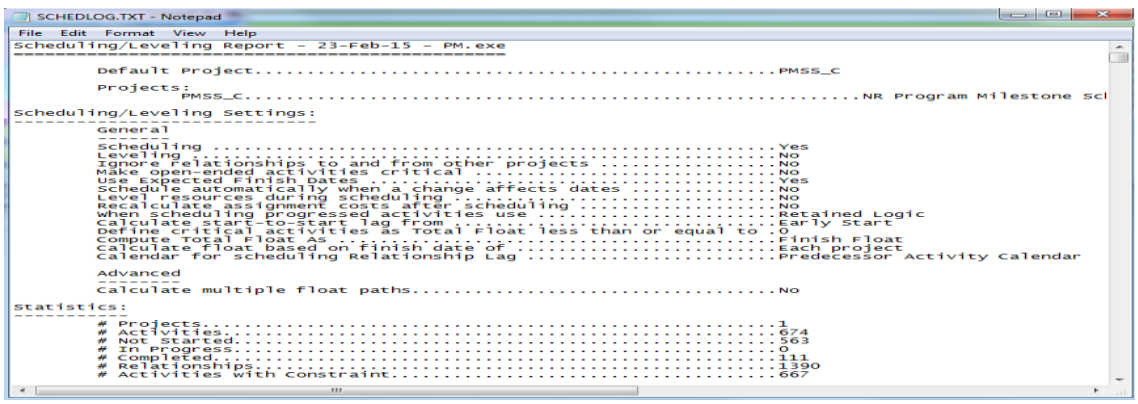


Figure 5-6: Example of Scheduling Log

4.5.3 Apply EP_QC Layouts and fix all issues identified, in particular out of sequence activities and all negative floats. Where activity fast tracking results in some activities with a negative float (i.e. the project cannot achieve the target deadlines as scheduled), the vendor manager should report to the relevant OPG Project Manager and determine an achievable path forward.

4.5.4 Following resolution of all issues, final scheduling (F9) should be performed again for the current scheduling period.

5.0 CRITICAL PATH, BASELINE COMPARISON AND FLOAT ANALYSIS

This section provides instructions in Critical Path, Baseline comparison and float analysis.

5.1 Critical Path and Critical Activities

As discussed in Project Setup and Settings [Section 3.1], *Critical Activities* are defined as **Total Float less than or equal to 20h.**

5.1.1 In the ***Activities*** window of P6, there are 3 layouts designed to help review the *Critical Path* and *Critical Activities* at different level of schedules. After scheduling (F9), these layouts should be applied to review the *Critical Activities*.

- EP_402_PROJ_L1_SCH_CRITICAL
- EP_421_PROJ_L2_SCH_CRITICAL
- EP_441_PROJ_L3_SCH_CRITICAL

5.2 Baseline Comparison and Float Analysis

5.2.1 After scheduling (F9), the Project Team should assign the previous *Month/Week End Copy* as *Primary Baseline.* This enables the scheduler to compare the current schedule with previous Month/Week End status.

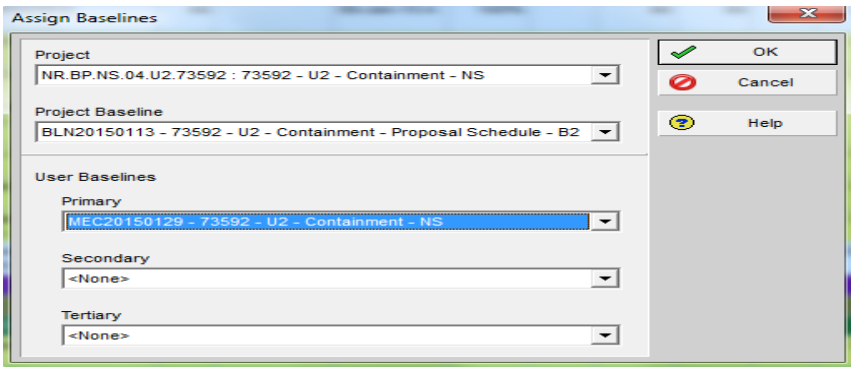
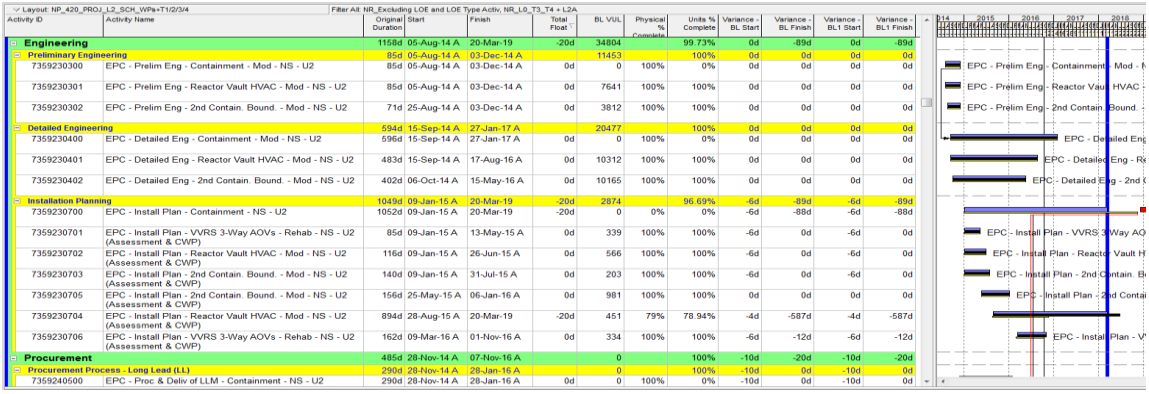


Figure 6-1: Assign Month/Week End Copy as *Primary Baseline*

5.2.2 In the ***Activities*** window, apply the Global Layout:

- EP_420_PROJ_L2_SCH_WPs+T1/2/3/4

With this layout, review and perform analysis for the *Physical % Completion, Units % Completion, Total Float*, *Variance from Baseline Start*, *Variance from Baseline Finish*, *etc.*



Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	BL VUL	Physical % Complete	Units % Complete	Variance - BL Start	Variance - BL Finish	Variance - BL1 Start	Variance - BL1 Finish
Engineering		1158d	05-Aug-14 A	20-Mar-19	-20d	34804		99.73%	0d	-89d	0d	-89d
Preliminary Engineering		85d	05-Aug-14 A	03-Dec-14 A		11453		100%	0d	0d	0d	0d
7359230300	EPC - Prelim Eng - Containment - Mod - NS - U2	85d	05-Aug-14 A	03-Dec-14 A	0d	0	100%	0%	0d	0d	0d	0d
7359230301	EPC - Prelim Eng - Reactor Vault HVAC - Mod - NS - U2	85d	05-Aug-14 A	03-Dec-14 A	0d	7641	100%	100%	0d	0d	0d	0d
7359230302	EPC - Prelim Eng - 2nd Contain. Bound. - Mod - NS - U2	71d	25-Aug-14 A	03-Dec-14 A	0d	3812	100%	100%	0d	0d	0d	0d
Detailed Engineering		594d	15-Sep-14 A	27-Jan-17 A		20477		100%	0d	0d	0d	0d
7359230400	EPC - Detailed Eng - Containment - Mod - NS - U2	596d	15-Sep-14 A	27-Jan-17 A	0d	0	100%	0%	0d	0d	0d	0d
7359230401	EPC - Detailed Eng - Reactor Vault HVAC - Mod - NS - U2	483d	15-Sep-14 A	17-Aug-16 A	0d	10312	100%	100%	0d	0d	0d	0d
7359230402	EPC - Detailed Eng - 2nd Contain. Bound. - Mod - NS - U2	402d	06-Oct-14 A	15-May-16 A	0d	10165	100%	100%	0d	0d	0d	0d
Installation Planning		1049d	09-Jan-15 A	20-Mar-19	-20d	2874		96.69%	-6d	-89d	-6d	-89d
7359230700	EPC - Install Plan - Containment - NS - U2	1052d	09-Jan-15 A	20-Mar-19	-20d	0	0%	0%	-6d	-88d	-6d	-88d
7359230701	EPC - Install Plan - VVRS 3-Way AOVs - Rehab - NS - U2 (Assessment & CWP)	85d	09-Jan-15 A	13-May-15 A	0d	339	100%	100%	-6d	0d	-6d	0d
7359230702	EPC - Install Plan - Reactor Vault HVAC - Mod - NS - U2 (Assessment & CWP)	116d	09-Jan-15 A	26-Jun-15 A	0d	566	100%	100%	-6d	0d	-6d	0d
7359230703	EPC - Install Plan - 2nd Contain. Bound. - Mod - NS - U2 (Assessment & CWP)	140d	09-Jan-15 A	31-Jul-15 A	0d	203	100%	100%	-6d	0d	-6d	0d
7359230705	EPC - Install Plan - 2nd Contain. Bound. - Mod - NS - U2 (Assessment & CWP)	156d	25-May-15 A	06-Jan-16 A	0d	981	100%	100%	0d	0d	0d	0d
7359230704	EPC - Install Plan - Reactor Vault HVAC - Mod - NS - U2 (Assessment & CWP)	894d	28-Aug-15 A	20-Mar-19	-20d	451	79%	78.94%	-4d	-587d	-4d	-587d
7359230706	EPC - Install Plan - VVRS 3-Way AOVs - Rehab - NS - U2 (Assessment & CWP)	162d	09-Mar-16 A	01-Nov-16 A	0d	334	100%	100%	-6d	-12d	-6d	-12d
Procurement		485d	28-Nov-14 A	07-Nov-16 A		0		100%	-10d	-20d	-10d	-20d
Procurement Process - Long Lead (LL)		290d	28-Nov-14 A	28-Jan-16 A		0		100%	-10d	0d	-10d	0d
7359240500	EPC - Proc & Deliv of LLM - Containment - NS - U2	290d	28-Nov-14 A	28-Jan-16 A	0d	0	100%	0%	-10d	0d	-10d	0d

Figure 6-2: Example of Global Layout to Support Schedule Analysis

Note that negative total floats are not allowed unless corrective actions are initiated and formally approved by the OPG Project Manager. Negative variance date numbers from the two baselines should be assessed and documented in project performance reporting. Super large floats should be analyzed and dispositioned.

5.3 Schedule Performance Assessment

5.3.1 In the ***Activities*** window, there are several layouts designed to perform schedule performance assessment.

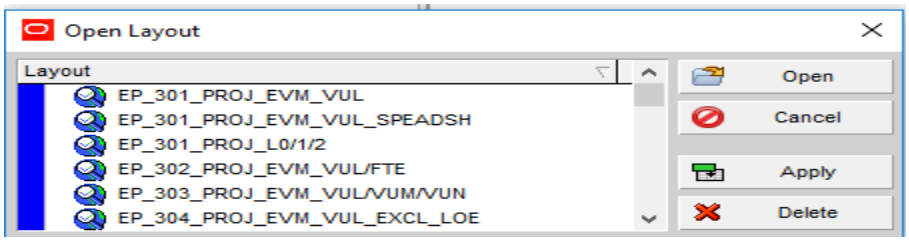


Figure 6-3: Global Layouts to Support Schedule Performance Assessments

5.3.2 An SPI below 0.90 should be explained in the project performance report. Corrective actions are to be developed by vendor, approved by OPG Project Manager and implemented in the schedule for the next scheduling period.

Example: In figure 6-4, layout ***EP_301_PROJ_EVM_VUL*** shows the current ***Schedule Performance Index*** (SPI) and ***Schedule Variance*** (SV) which quantifies the delayed work volume by Labor Hours.

From the diagram below, the project SPI is 0.90. The cause of the delay can be assessed by reviewing performance at the lower levels of the WBS (i.e. Scope Category, Control Account and Work Package). In this example the Construction Scope Category is the primary contributor to the overall project schedule delays. The project team could further assess the details and identify which work package(s) are contributing to the delay. In the 'S' curve, the dark green is from the **Project Baseline** schedule file, the light green is from the **current** schedule file, and the red curve is the Earned Value.

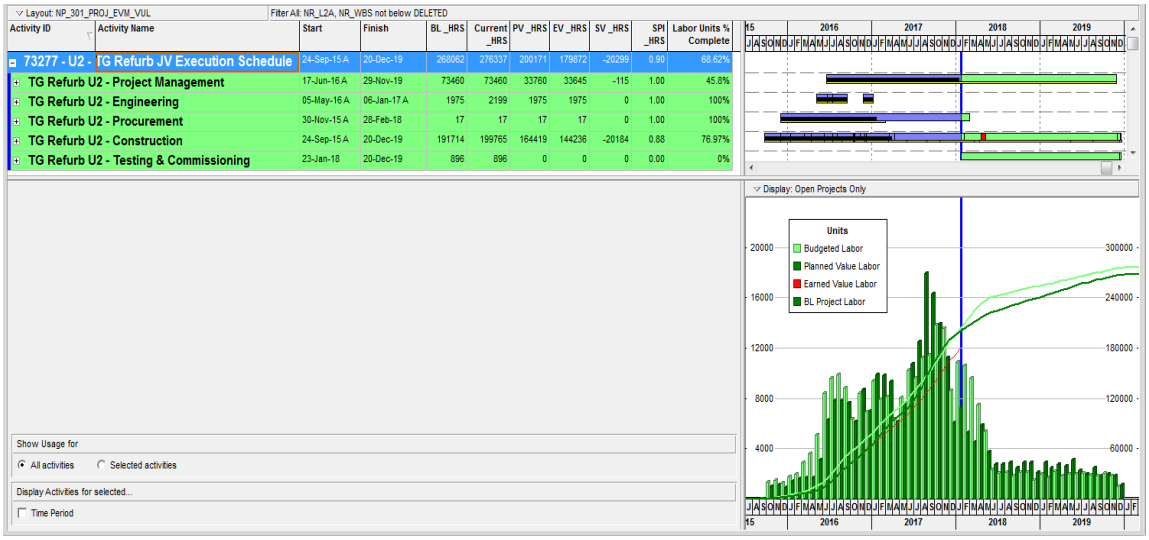


Figure 6-4: Example of Schedule Performance and Schedule Variance

6.0 OTHER TECHNICAL REQUIREMENTS

This section is to provide other technical requirements for P6 scheduling including Schedule Status, budgets, User Defined Fields, Activities, Layouts, Filters, Importing, Schedule Close, Deleting Schedules and P6 Logging Out.

6.1 New Schedules and Planned Schedules

6.1.1 All requests for new P6 schedules in the OPG P6 production environment will be forwarded to the OPG EPMO.

6.1.2 EPS Whatif node is used for scenario analysis, and schedules below this node will be automatically deleted after one week.

6.1.3 EPS Plan Node is used for developing a new schedule, or revising a baseline copy. When approved, the schedule will be moved by P6 Administrators to EPS Active Node, for project control and reporting.

6.1.4 After schedules are moved to EPS Active Node, they will be configured to other systems such as BI Tool and EcoSys.

6.2 Budget

6.2.1 Currently, P6 ***Budget (Cost)*** functionality is not used for OPG projects.

6.3 User Defined Fields

6.3.1 User Defined Fields are maintained by EP_P6_Admin.

6.4 Activities

6.4.1 The addition of Level 3 Activities is the responsibility of the Level 3 schedule owner (i.e. OPG or vendor). When adding Level 3 Activities, the following information should be considered:

- Duration, Start and Finish time
- Resources and budgeted hours
- Calendar
- Global Coding
- Relationships

6.4.2 Vendor schedulers should not delete Level 2 Activities, Level 1 Activities and Project Milestones, or rename Activity IDs or Activity Names without approval from the OPG Project Manager, and appropriate change control authority as per Integrated Change Control manual [RX].

6.4.3 When copying Activities, ensure that ***Relationships only between copied activities*** is checked.

6.4.4 The ***Activity Durations*** should enable performance monitoring and control. Normally, the durations should not be more than two reporting periods.

The following provide guidelines to durations.

- **Durations of Level 1 Activities (Control Accounts):** as a guide, typically no longer than 6 months for onsite construction Control Accounts. Non Construction and LOE can be longer, but within one release gate.
- **Durations of Level 2 Activities (Work Packages):):** as a guide, typically no longer than 2 months for onsite construction Work Packages and 12 months for non Construction but deliverable oriented Work Packages. LOE Packages can be longer, but within one release gate.
- **Durations for Level 3 Activities):** as a guide, typically no longer than 2 weeks (this is called *80 Hour Law*) for onsite Construction Work, 1 month for non-construction but deliverable oriented activities. LOE can be longer.

6.5 Layouts

6.5.1 Schedule Layouts are the primary graphic outputs used by schedulers to present the project. Schedule Layouts may be global or assigned to a particular schedule file, or by a particular user. Global layouts are maintained by the EPMO Scheduling Department.

6.5.2 The scheduler may copy global layouts for his/her own use or may develop his/her own layouts for internal use within the project team.

6.5.3 A standardized naming convention is required for all layouts. Global layouts will begin with a business unit reference (e.g. 'RG_' for Renewable Generation, and 'NP_' for Nuclear Projects). It is recommended that all user specific layout reference the business unit and initial of the person that created the layout (e.g. 'NP_XX001' where XX is the creator's initials, and '001' is the layout number).

6.6 Filters

6.6.1 Global filters are developed by the EPMO Scheduling Department and used by all schedulers.

6.6.2 Vendor schedulers can create and modify their own filters. As with layouts, good housekeeping practice is required, and unused filters should be deleted.

6.6.3 Filters can be promoted to be Global after approval by EPMO Scheduling Manager. When naming Global filters, start the description with the vendor name (e.g. Siemens) followed by a description of the filter, such as *SMZ_XXXX.*

6.7 Importing Projects

- Schedules that have requirements on Station Work Control Integration, should be imported into OPG P6 Instances, merged into the OPG Level 2 Control Schedule for relevant execution activities. Besides, OPG Schedulers may also need to import and use Vendor's Level 3 Schedule to develop or update the OPG Level 2 Control Schedule.
- The following steps are mandatory and are to be performed by the vendor prior to creating an XER file.
  - Check and correct schedule default settings.
  - Run "Check project integrity" and fix any errors.
  - F9 the schedule.

- Export in XER format only, and send the XER file to EPMO Schedule SME.
- EPMO Schedule SME is to import the XER File firstly to P6 Stage Instance to make sure there is no issue.
- EPMO Schedule SME is to import the XER File firstly to P6 Production Instance to make sure there is no issue.

Questions about this process will be directed to EPMO Scheduling Department.

6.8 AS7 Imports

6.8.1 For Projects that have requirement for Station Work Control Integration, AS7 Work Order tasks are imported into P6 schedules on a daily basis. Dates from P6 are exported back to AS7. Accomplishments are imported from AS7.

6.8.2 For AS7 imported work the following rules apply,

- Do not modify the activity IDs.
- Do not update status in P6. Accomplishments are imported from AS7.
- Do not modify activity descriptions, durations, Work Hours, resources or crews in P6. All this information is brought from AS7 and should be modified in AS7.

Questions about this process will be directed to OPG EPMO Scheduling Department or Station Work Control team.

6.9 Schedule Close

6.9.1 When a project is finished, in P6,

- The scheduler is to actualize all activities and all resources, and calculate (F9) the schedule;
- P6 Administrator is to change the value of the Project Code ***Curr_Project_Status*** to ***C***;
- P6 Administrator is to move the schedule to Complete Project EPS Node where nobody has access except the P6 Administrator;
- P6 Administrator is to record the schedule close date in the P6 Project Notebook: ***Current Status.***

6.10 Deleting Schedule Files in OPG P6

6.10.1 If a schedule is no longer required in P6, the file can be deleted through the following,

(a) Scheduler informs P6 Administrator.

(b) P6 Administrator highlights the Project **to Be Deleted** in Project Name,

(c) P6 Administrator cuts and moves it to the business unit specific **DELETE** node.

(d) New Horizons deletes it by the end of the day or week.

6.11 Logging Out from P6

When leaving for the day, OPG and vendor schedulers should log out of P6.

7.0 PROJECT EARNED VALUE MANAGEMENT IN PRIMAVERA

Earned Value Management in the schedule is to break down the Project value and distribute to all Work Packages in the Work Breakdown Structure (WBS); once the work is finished, the relevant value is earned; then the value of the work completed is (1) compared with the value of the work planned by the data date, and (2) compared with the value actually spent, which gives Schedule Performance Index (SPI) and Cost Performance Index (CPI).

7.1 Definitions

7.1.1 In OPG Project schedules, values are loaded to Level 2 Activities via three Value Units.

(a) Value Unit for Labor (VUL)

Every VUL refers to the *Work Quantity* that can be completed within one hour by one averagely skilled worker. For example, if it takes 2 workers 4 hours to install a certain pump, then the work quantity of that job is 8 VUL's.

In some construction companies, *Value Unit for Labor* is called Workload Point or Value Point for Labor, or simplistically Person Hours, Worker Hours or Labor Hours.

(b) Value Unit for Materials (VUM)

VUM refers to the dollar Value of Materials, and every VUM refers to one Canadian Dollar at the moment when the contract is awarded.

For example, if upgrading the power cables in a certain power plant system needs 50K$ to purchase materials in 2018, then this project needs 50K VUM. When doing the same job in 2028, the VUM is still 50k, but an inflation factor can be applied to the rate of the VUM.

(c) Value Unit for Non-Labour (VUN)

VUN refers to the dollar value of Non Labor, such as the value of purchased services, and every VUN refers to 1 Canadian Dollar at the moment when the contract is awarded.

For example, VUN is to be applied when renting a heavy lift or an office building for a certain period, or contracting out some design packages to a sub-contractor and there is no need for the owner to know how many labor hours will be used.

7.1.2 **Planned Value (PV):** The budget assigned to the scheduled work to be accomplished for a schedule activity or WBS component up to the data date.

7.1.3 **Earned Value (EV):** The value of completed work expressed in terms of the approved budget assigned to that work for a scheduled activity or WBS component. Note the budget and cost here can be expressed by dollar value, units of Labor Hours or work quantities.

7.1.4 **Schedule Performance Index (SPI):** A measure of schedule efficiency on a project. It is the ratio of earned value (EV) to planned value (PV). SPI=EV/PV.

7.1.5 **Schedule Variance (SV):** A measure of schedule performance on a project. It is the difference between the earned value (EV) and the planned value (PV). SV=EV-PV.

7.1.6 **Budget at Completion (BAC):** The sum of all the budget values established for the work to be performed on a project or a work breakdown structure component or a scheduled activity.

7.1.7 **Budget to Completion (BTC):** The sum of all budget values from the data date to project completion. BTC=BAC-AC.

It is important to note that all the values, budgets and costs discussed above can be expressed not only by ***Dollar Values***, but also by ***Value Units.***

7.2 Planned Value Setting

7.2.1 The Planned Value Setting process is as follows,

- **Step 1:** The Owner develops Project Level 1 Schedule that includes milestones (such as contractual dates) and Control Accounts. At this step, each Control Account has only one package that is the Planning Package. Budgets/estimates (Value Units) are broken down and loaded to the Planning Packages before contract awarding.
- **Step 2:** After contract awarding, vendor breakdowns the Planning Packages to Work Packages and further detail to Level 3 Activities. Budgets/estimates (Value Units) are also broken down and allocated to Work Packages from the Planning Packages. A bottom-up estimation is applied, the budgets/estimates from Level 3 Activities are rolled up to Work Packages, and then compared with the top-down estimation numbers.
- **Step 3:** The Owner summarizes and integrates all Work Packages into Owner's Level 2 Schedule(s), with Budgets loaded on Level 2 Activities.

Once approved, the Level 1, Level 2 and Level 3 Schedules are saved as the Control Version baselines.

7.2.2 During preliminary planning stage (before Contract Awarding), OPG Project Teams

- Follow Section 2.3 of this guide to develop the Project WBS down to Control Accounts, and setup the Project Level 2 Control Schedule.
- Define a Planning Package for each Control Account.
- Estimate the total Labour Hours, the total Budget of Materials, and the total Budget of Purchased Services for each Control Account.
- Load the three Value Units to relevant Planning Packages.
- Once approved, the schedule will be saved as original Baseline.

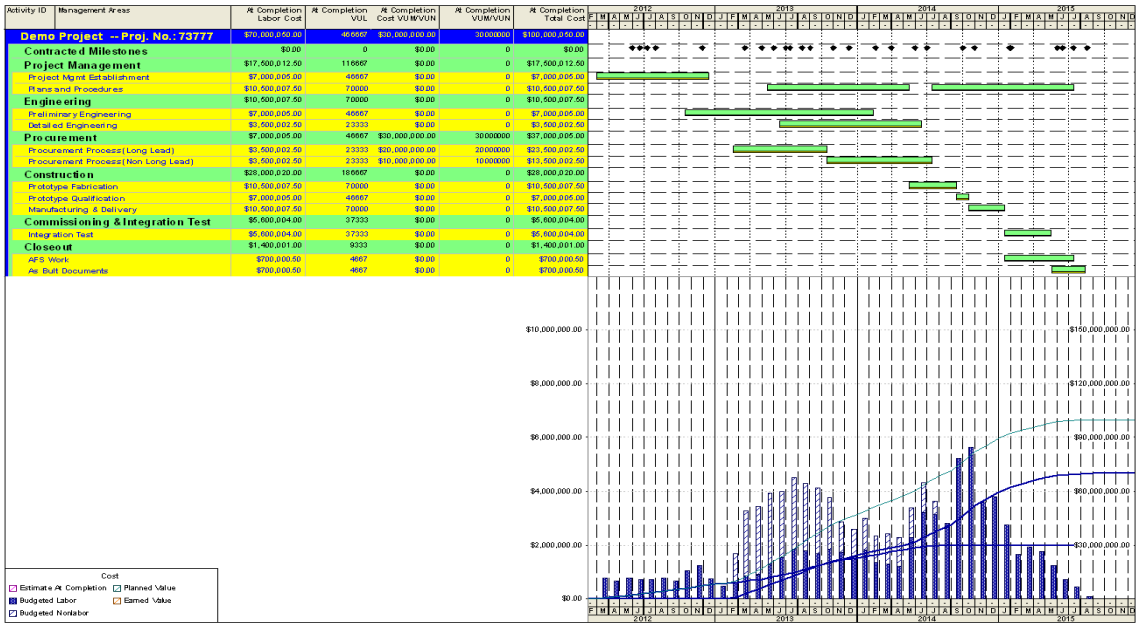


Figure 8-1: Value Units Loaded into the Schedule

7.2.3 Once the vendors' detailed schedules are fully developed and approved by OPG, bottom-up estimation (rolled up to Work Package level) will replace the top-down estimates (at Control Account level) that were developed in the preliminary planning phase.

In Contractors' Level 3 Schedule, specific resources, such as boilermakers, electricians, pumps, motors, etc., are loaded to Level 3 activities. Those resources should have no rates in OPG P6.

In addition to the specific resources loaded to Level 3 Activities, *VUL, VUM, VUN, Major Work Quantities* and *Weighted Steps* should be loaded to Level 2 Activities (Work Packages) in vendors' Level 3 Schedule.

OPG schedulers then copy from the vendors Level 3 Schedule the Level 1 and Level 2 Activities that have *Value Units*, *Work Quantities* and *Weighted Steps* loaded. The OPG scheduler changes the Activity Type of all Level 2 Activities to *Task Dependent*, builds the logic ties as much as possible, while constraints, lags and SS relationships can be used, and finally calculates the Level 2 schedule.

Once formally approved, the Level 2 Schedule will be baselined and it becomes the Control Version for OPG Project performance tracking and reporting.

7.3 Resource Loading to Level 2 Activities

7.3.1 Planned Value setting in P6 is by resource loading. It is mandatorily required to load up *Value Unit* resources including ***VUL***, ***VUM*** and ***VUN***, to Level 2 Activities (*WBS Summary Activities* for Work Packages) in both Level 2 and Level 3 Schedules. *Resource Curves* can be applied when necessary.

7.3.2 It is mandatorily required to load ***Major Work Quantities / Commodities*** to relevant Level 2 Activities in both Level 1 and Level 3 Schedules. For example, in the diagram below, *Number of Pressure Tubes to Be Removed*. *Resource Curves* can be applied

when necessary. The *Resource Type* of *Work Quantities* is *Material*, and there should be no rates for *Work Quantity* resources.

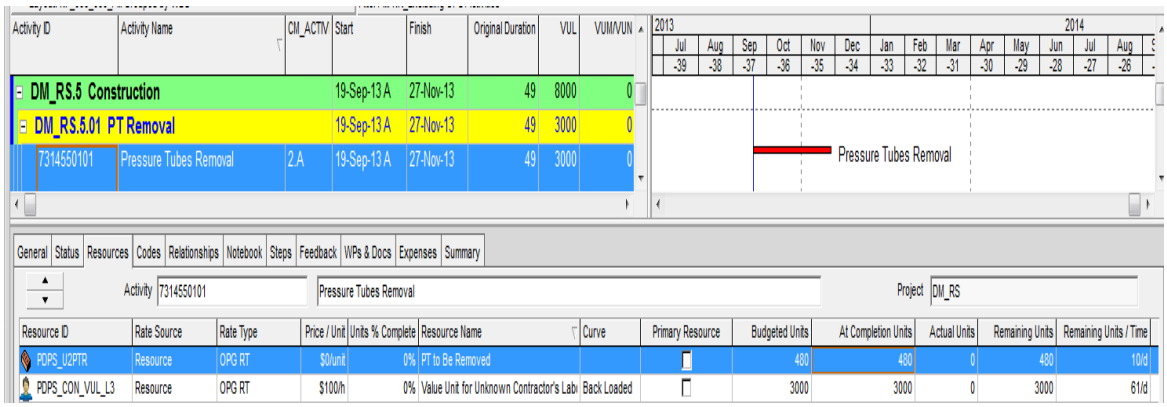


Figure 8-2: Major Work Quantities

7.3.3 It is mandatorily required to load up ***Activity Steps*** to relevant L2A Activities in Level 3 Schedules as much as possible.

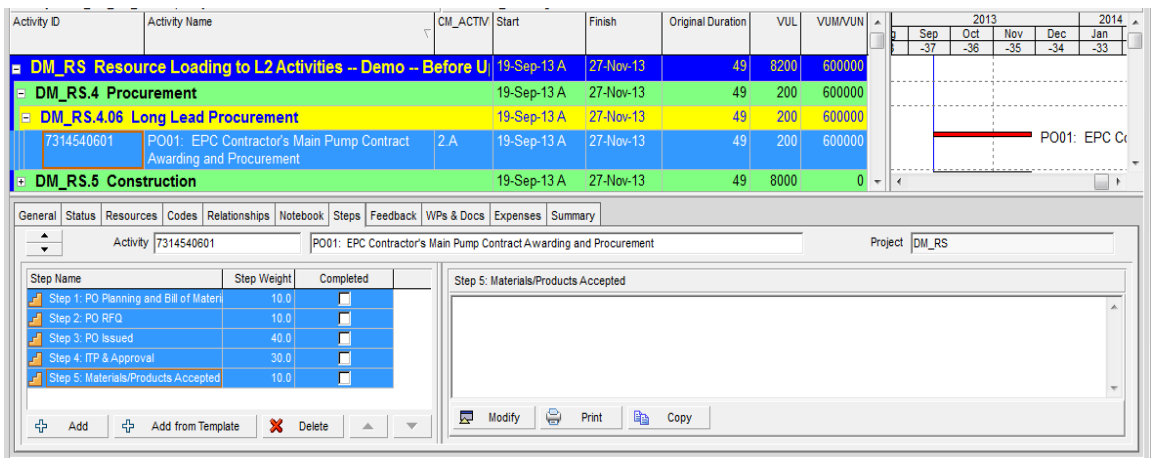


Figure 8-3: Activity Steps

7.4 Quality Checks

7.4.1 After resource loading, ensure for all activities:

- Planned Start Date = Start Date, and Planned Finish Date = Finish Date;
- Budgeted Units = At Completion Units = Actual Units + Remaining Units.
- Total VUL loaded to Level 2 Activities is aligned to the total labor hours loaded to detailed Level 3 Activities of this Work Package.

7.5 Earning Rules

Once *Budgeted Value Units* are loaded to Level 2 Activities and the schedules enter implementation, 4 major techniques are used for calculating *Completion Percentages*; after that, *Earned Values* are calculated by multiplying the *Completion Percentages* in current schedule with the *Baseline Budgeted Value Units*.

Here below are the 4 major techniques for obtaining the Completion Percentages. Please see Appendix I for the EPC Project Standardized Earning Rules.

7.5.1 Physical % Complete by Work Quantities

For Level 2 Activities that have substantial work quantities/commodities, such as Electric Panels Periodic Test, Pressure Tubes Removal, Pump Replacement, Steam Generator Tubes Non Destructive Test, etc., the substantial *Work Quantities* should be established in Primavera P6 in the *P6 Resource* functionality.

Particularly for EPC contract work, the vendors'/contractor's work quantities / commodities are crucial for progress tracking. As a mandatory requirement, the *Bill of Quantities* in the Contract should be loaded into P6 and assigned to relevant Level 2 Activities (Work Packages).

For example, if there is Level 2 Activity named *Unit 2 Pressure Tube Removal*, not only VUL (total Labour Hours) is to be loaded to this Level 2 Activity, but also the *Work Quantity* is to be loaded to this Level 2 Activity in P6.

- Work Package Name: Unit 2 Pressure Tube Removal
- Work Quantity Name: PT's to Be Removed
- Quantity: 480

During schedule implementation, the actual number of PT's Removed in each scheduling period is to be recorded in Primavera P6 to show the work progress, and the number is used for calculating *Physical % Complete*.

7.5.2 Physical % Complete by Weighted Activity Steps

According to contract strategies, for some Work Packages, the owner might not need to track all the details of contractors' work, but only focus on some pre-defined check points. In this situation, P6 *Activity Steps* are used for *Physical % Complete* at Work Package level.

For example, a Construction Package might be *U2 Turbine Re-heater Replacement* and we estimated that this job needs 2000 Labour Hours, so the Budgeted VUL is 2000. This Work Package may contain 200 Level 3 Activities, while the owner may not need to track in that detail; but rather, following the Contract, the check points might be set as

- Site Prep. Finished 10%
- Old Re-heater Removed 20%
- New Re-heater Installed 30%
- New Re-heater Alignment and Bolts Fastening 20%
- Auxiliaries Installed and Inspections 10%
- End of Erection Summary Report 10%

By checking the *Activity Steps* in Primavera P6, the *Physical % Complete* is obtained.

For standardized processes of Work Packages, a list of *Activity Steps* templates have been developed in OPG P6 Instance, and can be used to assign to relevant Work Packages. Besides these templates, other *Activity Steps* can be developed by Vendor's schedulers for specific Work Packages.

7.5.3 Physical % Complete by Management Assessment

Objective assessment always takes the first priority, whilst *Management Assessment* is still to be used in some areas where there are no objective criteria to measure the completion percentages. In those situations, project managers (of the Owner and Vendor) themselves give a subjective assessment of the completion percentage for the status of the Work Package.

7.5.4 Physical % Complete by Passage of Time

Level of Effort (LOE) is the work scope of a general or supportive nature for which performance cannot be measured or is impracticable to measure. Resource requirements are represented by a time-phased budget scheduled in accordance with the time that the support will likely be needed. The value is earned by the passage of time and is equal to the budget scheduled in each time period. The performance data provided is simply a comparison of budget of actual cost.

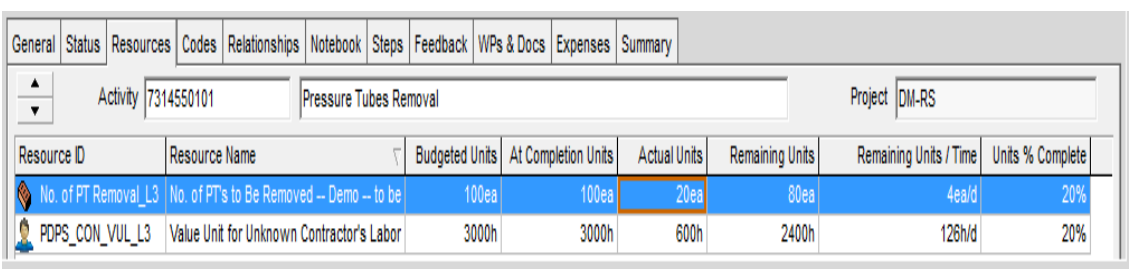
For example, the Planned VUL of an LOE Work Package might be 4000. If 50% of time has passed, then the PV and EV are both 2000, and the SPI=1.00.

It is to be emphasized that in any programs or projects, the value portion of LOE should be rigorously controlled.

7.6 Schedule Updating for Earning the Values

Earned Value Management is applied on Level 3 Activities in both OPG Level 2 Schedule and Vendor Level 3 Schedules. As Value Units and Major Work Quantities are loaded to Level 2 Activities (Work Packages), here below are the process to update Value Units and Major Work Quantities during project implementation on Level 2 Activities.

Let's assume before current updating, in the previous scheduling cycle, the status of the Work Package 7314550101 was as follows, and 20/100 Pressure Tubes had been removed,

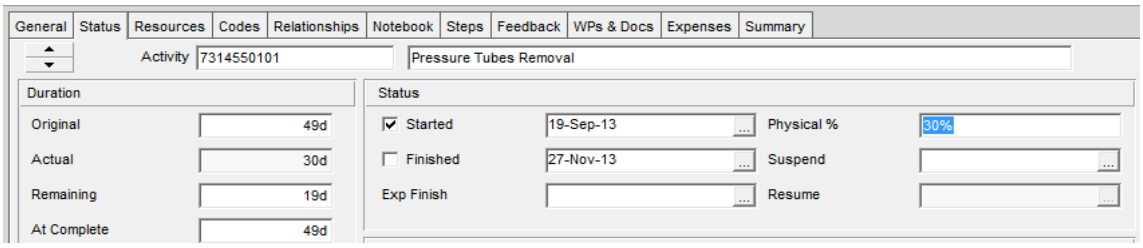


Resource ID	Resource Name	Budgeted Units	At Completion Units	Actual Units	Remaining Units	Remaining Units / Time	Units % Complete
No. of PT Removal_L3	No. of PT's to Be Removed -- Demo -- to be	100ea	100ea	20ea	80ea	4ea/d	20%
PDPS_CON_VUL_L3	Value Unit for Unknown Contractor's Labor	3000h	3000h	600h	2400h	126h/d	20%

By now, we suppose that altogether 30/100 Pressure Tubes have been removed and the *Physical % Complete* increases from 20% up to 30%. Here below are the steps,

Step 1: Manually calculate ***Physical % Complete*** outside P6 and record it in P6. Based on the Earning Rules, the ***Physical % Complete*** may be decided by *Major Work Quantities*, *Activity Steps*, *Management Assessment*, or *Passage of Time* (only for Level of Effort Packages).

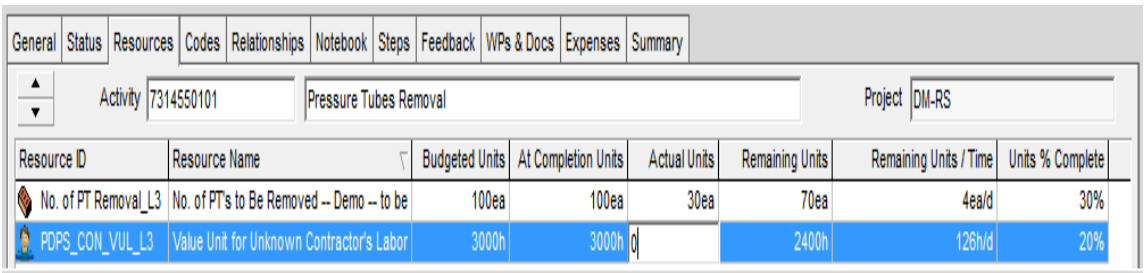
In this example, since 30/100 Pressure Tubes are removed, ***Physical % Complete*** is *30%*. Please change the number from 20% to 30%.



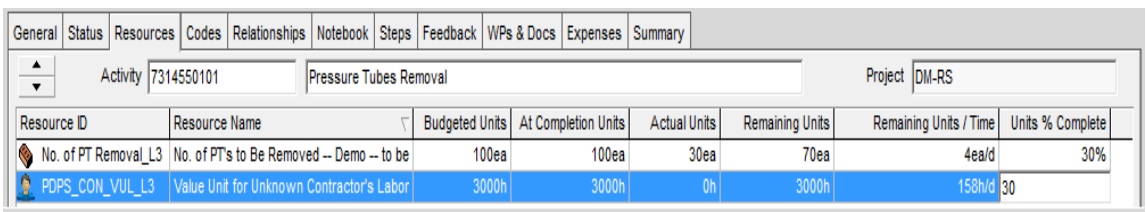
Step 2: Revise ***Budgeted Units*** only if necessary. That is to say, if the project team reassessed and think they need 3500 Labor Hours to finish this job, not the original budget 3000 Labor Hours, then set ***Budgeted Units*** = ***At Completion Units*** = ***3500***.

Please note the ***Baseline Budgeted Units*** is still 3000, unless baseline change is approved with CCF.

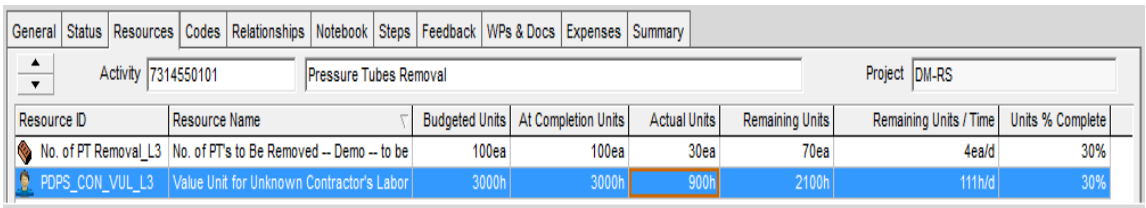
Step 3: Click *Resources*, set all ***Actual Value Units*** as 0. If VUL, VUM and VUN are loaded, the ***Actual Units*** of all of them need to be updated as 0.



Step 4: Select ***Units % Complete***, fill in the same number as the ***Physical % Complete***, that is *30%* in this example.



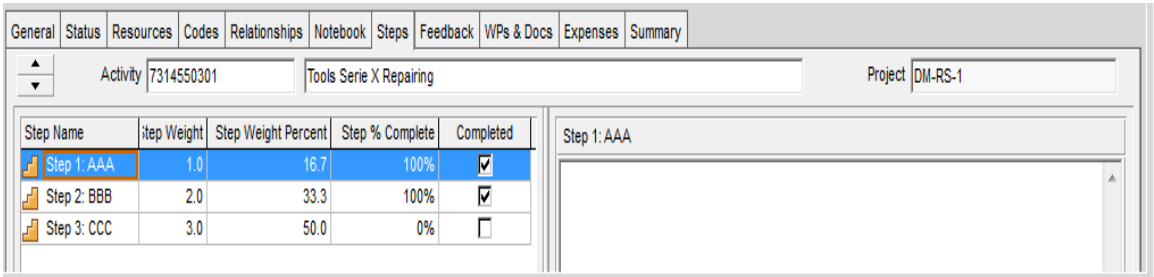
Step 5: Move your computer mouse away, P6 automatically calculates the ***Actual Units*** and ***Remaining Units*** for this updating cycle, based on the ***Units % Complete***.



Please note the ***Actual Units*** of VUL here refers to ***Actual Units Earned***, not ***Actual Hours Spent***. The ***Actual Hours Spent*** is not managed in P6.

When ***Activity Steps*** is used, after checking the ***Steps***, ***Physical % Complete*** will be calculated automatically.

After that, we follow the same process to manually update the Value Units Earned and Value Units Remaining.



7.7 Earned Value Analysis and Reporting

Once the schedules are approved and enter implementation, Earned Value Analysis and Reporting becomes a significant portion of periodic schedule management routine.

Please refer to Section 5.3 Schedule Performance Assessment.

Major reporting will be in BI Reporting Tool.

8.0 ROLES AND RESPONSIBILITY

8.1 EPMO – Scheduling Manager

(a) Acts as the single point of contact and subject matter expert for schedule management methodologies, processes, and associated tools and templates.

(b) Reviews and approves Scale Level A and B schedules, and review other schedules as required.

(c) Manages the operation of the PMIS scheduling tool (Primavera).

8.2 BU PMO – Scheduling Manager

(a) Assists the Project Manager with the development and review of schedule baselines.

(b) Maintains project schedules in the PMIS scheduling tool.

(c) Reviews and approves Vendors' Level 3 Schedules.

(d) Assists the Project Manager with progress measurement including earned value and schedule progress updates, etc.

(e) Assists the Project Manager with performing progress analysis of baseline schedule to actual schedule.

8.3 OPG Project Manager

(a) Ensures that schedules are planned, prepared, developed, monitored and controlled, including verifying accuracy of schedule information from other internal and external sources, and taking action to mitigate schedule performance issues.

(b) Directs OPG Project Scheduler to follow scheduling requirements to develop project schedules.

(c) Concurs OPG Level 2 Control Schedule and Vendor's Level 3 Schedule regarding SoW and WBS that reflects project implementation strategies, responsibility and budget allocation, etc.

8.4 EPMO - Scheduling Subject Matter Expert

(a) Maintains the Scheduling Manual, Guide and Desktop Guides, timely revise the documents as per new directions for continuous improvement.

(d) Provides guidance and consultation to Programs/Portfolios on P6 configuration establishment and P6 application, Program/Portfolio level scheduling.

(e) Provides guidance and consultation to OPG and Vendor schedulers on WBS development, scheduling and earned value management.

(f) Reviews schedules quality, including Deltek Acumen Fuse check.

(g) Develops Program/Portfolio level schedule layouts, filters and reports.

(h) Coordination with EPMO (OPG Enterprise Project Management Office) Reporting team for P6 data analysis.

(i) Establishes P6 configuration for OPG Programs/Project Portfolios.

(j) New scheduling tools and new P6 functionalities testing.

8.5 EPMO - P6 Administrator

(a) Establishes and maintain P6 configuration for OPG Programs/Project Portfolios, including EPS, OBS, RBS, Global and EPS level codes and UDFs, etc.

(b) P6 User and Access control, P6 Baseline management

(c) Global applications including Global Filters, Global Changes, Global Calendars, Global Layouts, etc.

(d) Creates new schedules and performs default setting.

(e) P6 housekeeping.

(f) P6 Data analyses.

(g) New Scheduling tools and new P6 functionalities testing.

8.6 OPG Project Schedulers

(a) Develops OPG Level 2 Schedules as per the requirements from Project Manager (for work aspect) and requirements of scheduling standards.

(b) Maintain OPG Level 2 Schedules to ensure the schedule reflects project progress and forecasting.

(c) Submit reports to OPG project team, OPG EPMO and BU PMO as required.

(d) Provide guidance and consultations to Vendor Schedulers to ensure Vendors Level 3 Schedules meet the OPG scheduling standards.

(e) Review Vendors' Level 3 Schedules.

8.7 Vendor Project Schedulers

(a) Develop Project Level 3 Schedules as per the requirements from OPG and Vendor Project managers (for work aspect) and requirements of OPG scheduling standards.

(b) Maintain Project Level 3 Schedules to ensure the schedule reflects project progress and forecasting.

(c) Submit reports to OPG project team, OPG EPMO and BU PMO as required.

9.0 ACRONYMS

BCS: Business Case Summary

BU PMO: Business Unit Project Management Office

CPM: Critical Path Method

CSA: Cost and Schedule Analyst

EPL: Enterprise Project List

EPMO: OPG Enterprise Project Management Office

EVM: Earned Value Management

OBS: Organizational Breakdown Structure

RBS: Resource Breakdown Structure

SoW: Scope of Work

VUL: Value Unit for Labor

VUM: Value Unit for Material

VUN: Value Unit for Non_Labor

WBS: Work Breakdown Structure

10.0 REFERENCES

Ref #	Document Number	Document title
R1	OPG-STD-0148	Project Management Standard
R2	OPG-MAN-00120-0010	Project Integration Management – Appendix A: Scalable Project Delivery Model
R3	OPG-MAN-00120-0014	Project Schedule Management
R4	SCH-DTG-003	Schedule Development
R5	N-MAN-00120-10001-SCH-11	Darlington Refurbishment: Schedule Management Plan for Integrated Level 3

R6	OPG-MAN-00120-0011	Project Scope Management
R7	SCH-DTG-001	Standard Project Milestones
R8	SCH-DTG-002	Schedule Control Coding
R9	Gate-FORM-002	P6 Schedule Implementation - Job Aid
R10	SCH-DTG-004	Schedule Baseline Management
R11	OPG-MAN-00120-0016	Project Integrated Change Control
R12	INT-TMP-001	Cost and Schedule Month-End Checklist

Appendix A: General Requirements to OPG Contractor's Level 3 Scheduling

Please find here below the general requirements to Level 3 Schedules developed by primary Contractors/Vendors that work for OPG projects.

1) SCHEDULING TOOLS

OPG Projects are scaled to 4 levels: Level A, Level B, Level C and Level D. Level A, B and C projects should have Level 3 schedules developed and maintained in OPG P6 Instance or Contractor's own P6 Instance.

For detail, please refer to Project Integration Management (OPG-MAN-00120-0010) and Project Schedule Management (OPG-MAN-00120-0014).

2) STANDARD MILESTONES

Standard milestones should be developed and coded to enable consistent program / portfolio reporting. Project milestones should be entered directly into Primavera schedule, or via the Schedule Milestone BI Interface Tool (Project level D only). Refer to the Enterprise Project Management Website for standard Project Milestones and Schedule Control Coding desktop guides.

For detail, please refer to Standard Project Milestones (SCH-DTG-001).

3) MULTI-LAYER AND MULTI-LEVEL SCHEDULING

Multi-Layer scheduling refers to the process in which a single schedule file contains activities of different levels, and high level activities are summaries of their lower level activities.

Multi-Level scheduling refers to the process in which a program or a project utilizes multiple schedule files with different level of details to suit different audiences and varied purposes. OPG the owner maintains a Level 2 Control Schedule in which the SOW is detailed to Work Packages, while contractors use a Level 3 Schedule that all Work Packages are broken down to detailed Level 3 Activities.

For detail, please refer to Project Schedule Management (OPG-MAN-00120-0014) and Project Scheduling Guide (OPG-GUID-00120-0001).

4) WORK BREAKDOWN STRUCTURE

Level A, B and C project shall have a WBS developed before developing Activities. In OPG projects, Work Breakdown Structure (WBS) is not a coding system but rather a top down decomposition of the SOW in a Program or Project, based on the implementation strategies.

OPG Level A, B and C Projects, no matter nuclear projects or non-nuclear projects, including EPC Projects and IT projects, are broken down to 4 Levels: Project, WBS Categories, Control Accounts and Work Packages.

Use of the standardized WBS structure and naming convention is mandatory as it provides the foundation of scope, cost and schedule integration within the Project Management Information Systems (PMIS) including project and program/portfolio reporting.

For detail, please refer to Project Scope Management (OPG-MAN-00120-0011).

5) REQUIREMENTS TO CONTROL ACCOUNTS

A Control Account is a group of relevant Work Packages that meet the following requirements,

- Control Accounts should follow the OPG Standardized WBS.
- A Control Account should contain one or a group of related Work Packages that are owned and can be completed by a unique organization.

Unique Organization does not preclude the requirement that Owner obliged activities such as Hold Point, Witness Point and Owner supporting activities should be included in Vendor's Work Packages; but the cost and labor hours of those activities are not in Vendor's Control Accounts.

- A Control Account should be assigned to one releasing Gate.
- A Control Account should be completed in a continuous time window.
- For Construction & Commissioning, the Control Account may be specific for one station Unit in one Outage or Innage window.
- Control Account durations should reflect the complexity of the work and facilitate adequate performance monitoring.
- As a guide, a medium (Level B) size project is recommended to be broken down to 20-50 Control Accounts, resulting in the average budget of one Control Account being 2-5% of the total project budget.

For detail, please refer to Project Scope Management (OPG-MAN-00120-0011).

6) REQUIREMENTS TO WORK PACKAGES AND PLANNING PACKAGES

Work Package

- A Work Package is a group of detailed activities that can be completed by a unique organization, in a continuous time window, in one location, and within one financial releasing Gate.

  Unique Organization does not preclude the requirement that Owner obliged activities such as Hold Point, Witness Point and Owner supporting activities should be included in Vendor's Work Packages; but the cost and labor hours of those activities are not in Vendor's Work Packages.

- Performance measurement, including earned value management, is performed at Work Package level and can be rolled up to Control Account, Scope Category, and Project etc.
- Work Package durations should reflect the complexity of the work and facilitate adequate performance monitoring, normally less than two reporting periods.

Planning Package

- A Control Account is subdivided further into Work Packages; or at the preliminary planning stage, it may contain only one planning package that is the space holder of the effort and budget.
- Below a Control Account, e.g., 50100, the ID of the Planning Package is 99, i.e., 50199. After the detailed planning stage, if three WPs are developed for 50100, then the effort and budget is moved from 50199 to 50101, 50102 and 50103.

7) SCHEDULE DEVELOPMENT MEETING

The OPG Project Team will schedule and conduct a Scheduling Development Meeting with contractor's Project Manager and Leading Scheduler soon after the Contract Effective Date, to commence development of the required Level 3 Schedule.

At this meeting, documents as

- OPG Manual: Project Scope Management (OPG-MAN-001200-0011)
- OPG Manual: Project Schedule Management (OPG-MAN-00120-0014)
- OPG Guide: Project Scheduling Guide (OPG-GUID-00120-001)
- OPG P6 Schedule Implementation – Job Aid (GATE-FORM-002)
- Project Scope of Work documents such as BCS and Contracts
- The specific Project WBS (down to Control Account level) for this contract

should be reviewed, and the scheduling methodologies shall be thoroughly discussed and demonstrated in Primavera P6.

8) REQUIREMENTS TO LEVEL 3 SCHEDULE DEVELOPMENT

The Scheduling Method to be used shall be a Critical Path Method schedule in the form of an activity on node Precedence Diagram Network (PDN) with capabilities of identifying the critical path. The principles and definitions of the terms used herein shall be as set forth in the Associated General Contractors of America's publication "The Use of CPM in Construction" latest edition.

Contractor should use Multi-layer scheduling to create the Level 3 Schedule that contains Level 0 (Project Milestones), Level 1 (Control Accounts), Level 2 (Work Packages) and Level 3 Activities. Level 1 and Level 2 Activities are WBS Summary Activities that represent Control Accounts and Work Packages respectively.

OPG has setup a set of mandatory codes, including Project Codes, WBS Codes, Calendars, Resource and Activity Codes etc. that shall be applied to schedules. P6 Schedules default settings shall follow OPG requirements.

For Renewable Generation Projects that are using *RG Code of Accounts* for cost management in OPG EcoSys, *P6 Cost Accounts* shall be established per the *RG Code of Accounts* for aligning the P6 Work Packages to relevant *Code of Accounts* in EcoSys.

For detail requirements, please refer to Project Schedule Management (OPG-MAN-00120-0014) and Project Scheduling Guide (OPG-GUID-00120-0001).

9) DCMA 14-POINT ASSESSMENT

The DCMA 14-Point Assessment methodology shall be used to test the quality of the Level 3 schedules of Level A, B an C projects, and Deltek Acumen Fuse is being utilised.

Among the ***Total Activities*** of the ***Level 3 Schedule***,

- Activities missing predecessor and/or successor should be less than 5%.
- Dangling activities should be less than 5%.
- Leads (negative lags) are not allowed in schedules.
- Relationships with lags should not exceed 5% of total relationships.
- Finish-to-Start relationships should be more than 90% of total relationships.
- Activities with constraints should not exceed 5%.
- Activities with high-float (44 days or more) should not exceed 5%.
- Construction activities with duration over two weeks should not exceed 5% (70 Hour Law).
- Negative floats are not allowed.
- Invalid forecast dates or invalid actual dates are not allowed.
- All activities with duration more than zero should have resource assignment.
- Number of activities missing from baseline to an update should not exceed 5%.
- There should be at least one path that leads activity sequence from start to finish of the project.
- During schedule implementation, Baseline Execution Index (BEI) should not be less than 95%.

Note:
(1) the ***Total Activities*** to be assessed with these 14 Point Assessment Criteria only refer to *Task Dependent Activities*, excluding *Milestones, Subproject Activities, WBS Summary Activities, LOE Activities* and *Completed Activities*.
(2) The BEI will be used in combination with Earned Value Analysis which is elaborated in Subsection 8 of this document.

10) EARNED VALUE MANAGEMENT

For Scale A and B Projects, Earned Value Management should be applied in P6 schedules. That includes the following aspects,

Planning the Values

- Value Units, including Value Unit for Labor (VUL), Value Unit for Non-labor (VUN) and Value Unit for Materials (VUM), should be loaded to Level 2 Activities that are Work Packages.
- During schedule development, one of the 4 Earning Rules should be specified to every Level 2 Activity: (1) by Work Quantities/Commodities; (2) by Weighted Milestones or Activity Steps; (3) by *Management Assessment;* (4) SPI=1.00 for Level of Effort Packages. Most of WPs should use the first two.
- Work Quantities/Commodities should be loaded to relevant Work Packages when applicable, such as *Number of Valves to Be Inspected*, *Number of Solar Panels to Be Removed*, etc.
- Weighted Milestones or Weighted Activity Steps should be applied to relevant Work Packages when applicable.

Earning the values

- During project implementation, Activity Steps, Work Quantities/Commodities, Value Units, and Physical % Complete, etc., should be timely updated to generate quality schedule performance data.

For detail, please refer to Project Scheduling Guide (OPG-GUID-00120-0001).

11) LEVEL 3 SCHEDULE QUALITY CONTROL

The following three tools should be applied to perform schedule quality check, before submitting a Level 3 Schedule for approval,

- ***EP_QC Layouts*** should be used to identify and clean the quality issues by the scheduler;
- ***Delteck Acumen Fuse*** should be used in the OPG EPMO and BU PMO;
- ***P6 Schedule Implementation Job Aid Checklist*** should be applied by the project team. All items must pass or be dispositioned before a schedule can be approved for acceptance. Refer to P6 Schedule Implementation - Job Aid.

When a Level 3 Schedule is ready for review and acceptance, Contractor's Project Team should prepare and submit the schedule in required layouts, together with the Job Aid and Scheduling Basis.

Comments made by OPG on the Baseline Schedule, during review, will not relieve the contractor from compliance with requirements of the Contract Documents. To the extent that there are any conflicts between the approved schedule and the requirements of the Contract Documents, the Contract Documents shall govern.

For detail, please refer to Project Scheduling Guide (OPG-GUID-00120-0001) and P6 Schedule Implementation - Job Aid (GATE-FORM-002).

12) LEVEL 3 SCHEDULE REVIEW AND ACCEPTANCE

Vendor's Level 3 schedule will be concurred by the OPG Project Team, Station Work Control Team, and approved by BU PMO Scheduling Manager.

- OPG Project team to ensure the schedule meets the requirements of the scope, budget and time, etc.
- Station Work Control Team to ensure the schedule meets the requirements of the Station, including work windows, system integrity and safety, etc.
- BU PMO Scheduling Department to ensure the schedule meets the requirements of OPG scheduling standards and process.

13) LEVEL 3 SCHEDULE BASELINE CONTROL

For all schedules that are in OPG P6 Instance, OPG P6 Administrator is responsible for the baseline control.

The Primary Contractor shall prosecute the project work in accordance with the approved Level 3 Schedule. Any changes to (1) Program/Portfolio level Milestones; (2) Project Milestones,

particularly Contractual Dates, and (3) Control Accounts (Level 1 Activities), shall go through formal Change Control Process in writing. These changes must be trial calculated and before the approval of the Change Order.

No change to the approved Baseline Level 3 Schedule shall be made without the prior written approval of the Owner. The Owner will provide a response within seven (7) days.

For Schedule Baseline management, please refer to Project Scheduling Guide (OPG-GUID-00120- 0001).

For Change Control, please refer to Project Integrated Change Control (OPG-MAN-00120-0016) and Integrated Change Control (CHG-DGT-001).

14) LEVEL 3 SCHEDULE UPDATING

Level 3 Schedules should be updated on a monthly or weekly basis as required by the OPG Project Manager.

Schedule updating have two aspects: (1) actualizing *Completed* and *In-Progress* Activities, and (2) revising *Future* Activities, including but not limited to

a. Actual Start Date and Actual Finish Date of each Work Package, Expected Finish Date for each in-progress Work Package.
b. Physical % Complete Percentage of each in-progress Work Package.
c. Major Work Quantities finished and remaining by the Data Date.
d. Activity Steps finished of relevant Work Packages.
e. Resource updating on Level 2 and Level 3 Activities.
f. Incorporation of approved changes, Field Memos, RFIs, and approved time extensions.
g. Status of outstanding Notices of Non-Compliance.
h. Correspondence with Job Memos.

The updated schedule prepared by the primary contractors shall include all information available as of the Data Date established by the Owner. A detailed list of all proposed schedule changes (logic, duration, status, additions, and deletions) and revised histograms and tabular reports for labor and construction equipment shall be submitted with the update.

This document is aimed to provide a big picture of the OPG scheduling requirements, while all relevant OPG project scheduling governance including Manuals, Guides, and Desk Top Guides, etc., shall be followed.

END OF THE SECTION

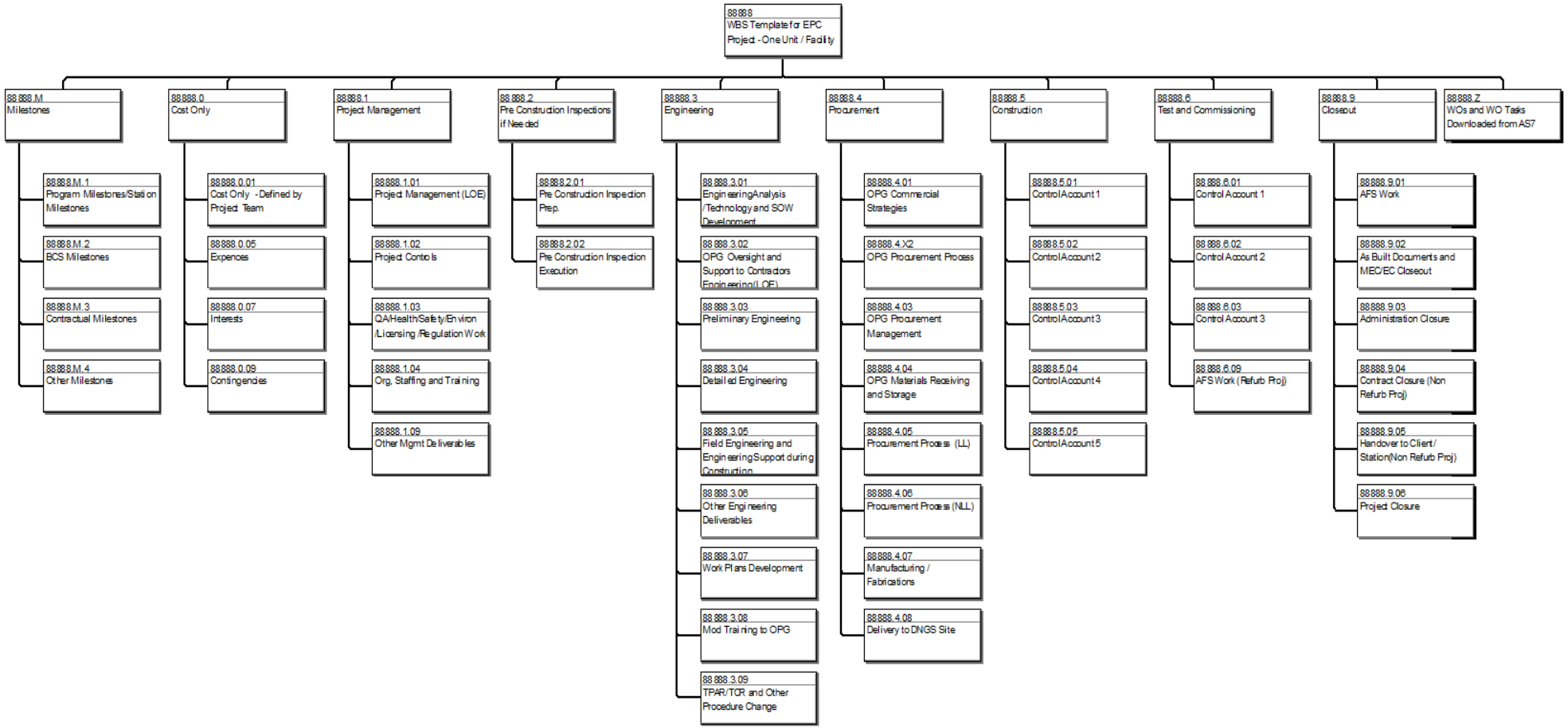
Appendix B: US DCMA14-Point Assessment Criteria

When developing a Level 2 or Level 3 Schedules, the **US DCMA 14-Point Assessment Criteria** should be used to check the schedule quality and all issues should be resolved or dispositioned based on the following criteria:

- **Logic:** Number of activities that are missing a predecessor, a successor or both should not exceed 5%.
- **Leads:** Leads (negative lags) are not allowed in the schedule.
- **Lags:** Number of lags in the schedule should be less than 5%.
- **Relationships:** Number of Finish to Start (FS) relationship should be more than 90%.
- **Hard Constraints:** Number of activities with hard or two-way constraints should not exceed 5%.
- **High Floats:** Number of activities with total float greater than 2 months (44 work days) should not exceed 5%.
- **Negative Floats:** Activities that are incomplete and have total float less than 0 working days are not allowed unless corrective actions are initiated and formally approved.
- **High Duration:** Construction activities with duration over two weeks should not exceed 5%.
- **Invalid Forecast Dates and Invalid Actual Dates:** There should not be any invalid dates including invalid forecast dates and invalid actual dates, in the schedule.
- **Resources:** Activities with duration more than zero should have resource assigned. At least more than 95% of activities for released work should have resourced assigned.
- **Missed Activities:** Number of activities missing from baseline to an update should not exceed 5%.
- **Critical Path:** There should be at least one path that leads activity sequence from start to finish of the project going through deliverable based activities.
- **Critical Path Length Index (CPLI):** During schedule implementation, CPLI less than 0.95 should be considered a flag and requires further investigation.
- **Baseline Execution Index (BEI):** During schedule implementation, BEI less than 0.95 should be considered a flag and requires further investigation.

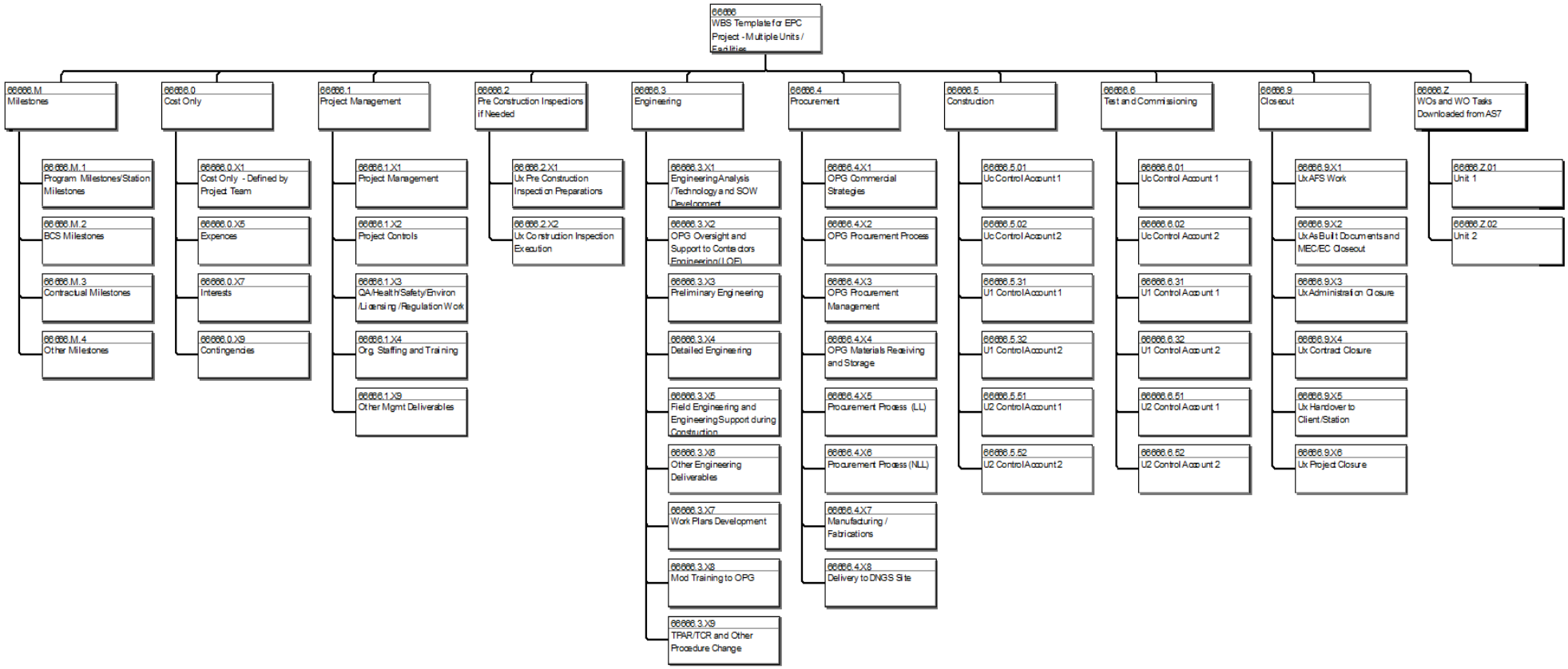
Note the ***Total Activities*** to be assessed with these 14 Assessment Criteria only include ***Task Dependent Activities***, excluding ***Milestones, Subproject Activities, WBS Summary Activities, LOE Activities*** and ***Completed Activities***. The **BEI** is used in combination with Earned Value Analysis.

Appendix C: Standard WBS Template for EPC Projects – Single Unit / Facility



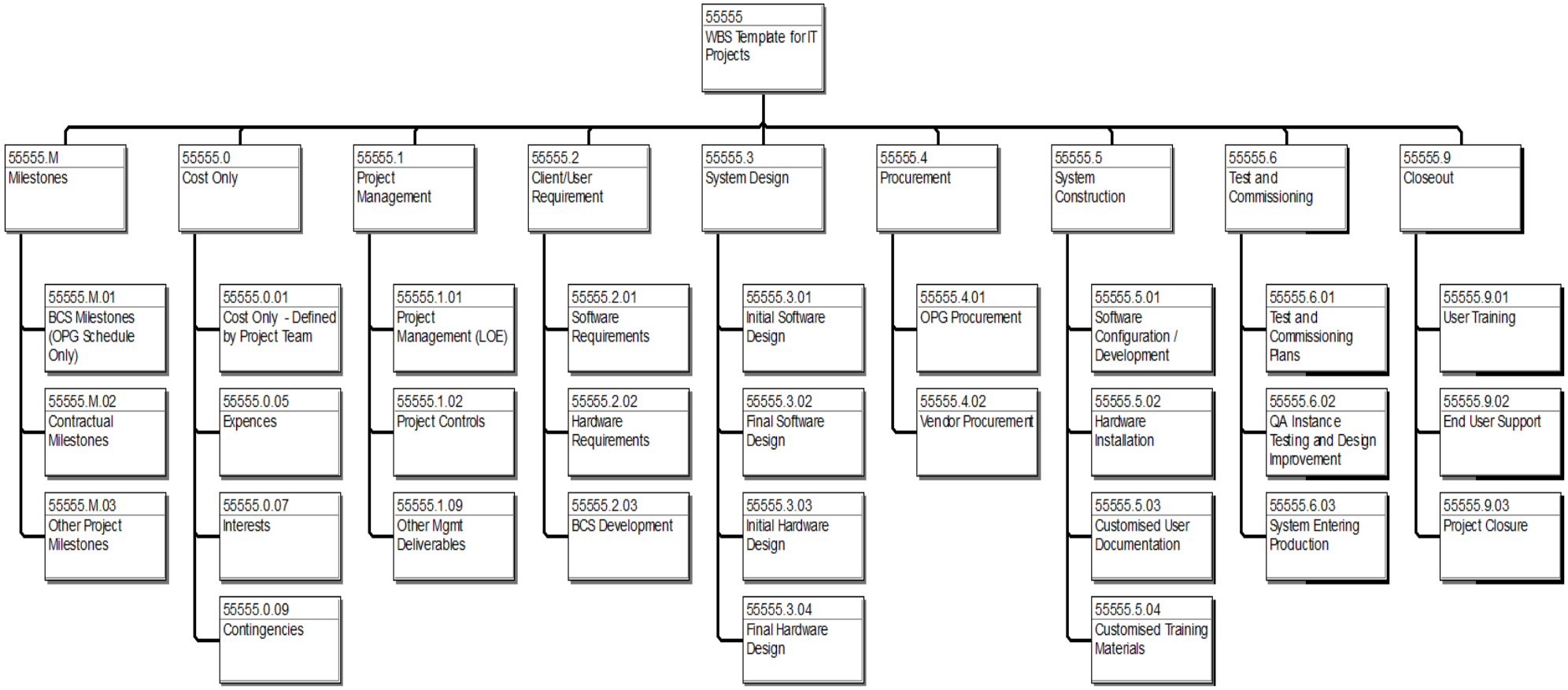
Note: (1) This template is for Projects that contain work of only one generating unit or construction facility; (2) 88888 is to be replaced by the 5-digit project number;(3) One Control Account should contain Work Packages in one continuous period, of only one owner and within one financial releasing Gate; (4) For Inspection, Construction and Commissioning work in power station, one Control Account contains work only in one Outage Window or Innage Window.

Appendix D: Standard WBS Template for EPC Projects – Multi Units / Facilities



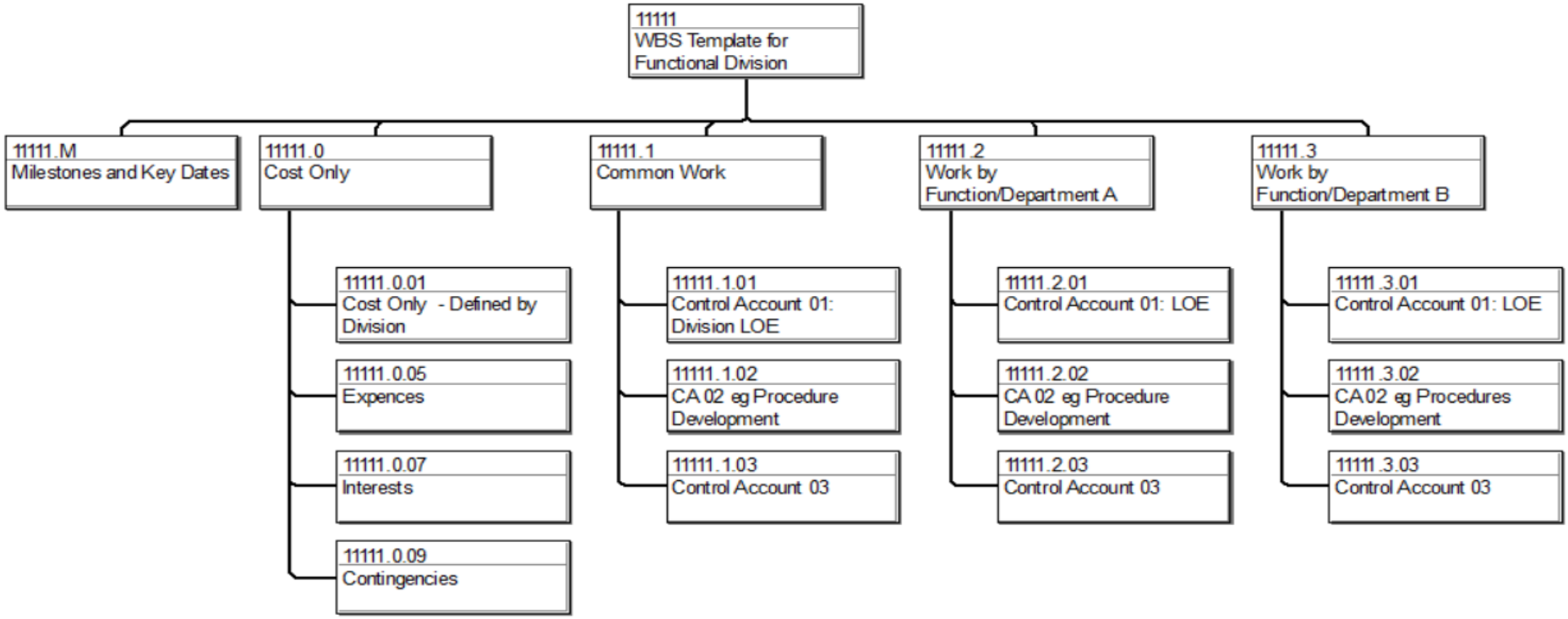
Note: (1) 66666 is to be replaced by the 5-digit project number; (2) One Control Account contains Work Packages in one continuous period, of only one owner and within one financial releasing Gate; (3) For Inspection, Construction and Commissioning work in power station, one Control Account contains work only on one Unit in one Outage Window or Innage Window.

Appendix E: Standard WBS Template for IT Projects



Note: 55555 is to be replaced by the 5-digit project number.

Appendix F: Standard WBS Template for Functional Division



- Below each Function/Department, Control Accounts are the natural groupings of Work Packages.
- XXXXX is the 5 digit project number.
- For example, if ***XXXXX.2*** is for ***Scheduling Department*** that may contain Control Accounts such as
  - *XXXXX.2.01.00: U2 Schedule Management (LOE)*
  - *XXXXX.2.02.00: U2 Scheduling Procedures Establishment*
  - *XXXXX.2.03.00: U2 Program L0/L1/L2 Schedules Development*

Appendix G: Basis of Schedule

For project level A and B, the Project Manager should request that contractors provide a *Basis of Schedule* document for the project execution phase as minimum requirement, with the submission of the baseline schedule. Other phases of the project lifecycle can be addressed if required.

1. Project General Information

1.1 SOW Summary

<<SOW Summary, including main Deliverables and Work Quantities>>

1.2 Implementation Strategies and Major Interfaces

1.3 Major Risks, Primary Assumptions and Constraints

1.4 Total Labour Hours and Resource Analysis

<<Analysis to the total labor hours and resource need>>

2. Major Milestones and Key Dates

<<19 Standard Milestones should be included in schedule if applicable. P6 Layout EP_300_PROJ_Milestones can be used to generate a report as Attachment. Please note 99999 is to be replaced with the project number.>>

No.	Milestone ID	Milestone Name	In Schedule (Y/N)
1	99999M0010	BCS for Gate 1 Approved	
2	99999M0020	Preliminary Design Complete	
3	99999M0030	PO Issued	
4	99999M0040	Long Lead Material Identified	
5	99999M0050	Detailed Engineering Complete	
6	99999M0060	BCS for Gate 2 Approved	
7	99999M0100	BCS for Gate 3 Approved	
8	99999M0140	Start of Installation	
9	99999M0150	Finish of Installation (FOI)	
10	99999M0160	Commissioning Finished	
11	99999M0170	Available for Service (AFS)	
12	99999M0180	Close out Completed	
13	99999M0190	Project Complete	

3. WBS Dictionary

<< SCOPE-TMP-001 WBS Dictionary is used as an Attachment>>

4. Calendars Used in the Schedule

No.	Calendar	Reasons
1		
2		
3		
…		

5. Coding Structures for Generating Various Schedules Layouts

<< Check the major codes being used, and add those that are not in the list>>

Major Codes	Beings Used (Y/N)	Major Codes	Being Used (Y/N)
CM_Activity_Level		NR_CWP Number	
CM_MEC		NR_Execution_Window	
CM_EC		NR_Milestone Reporting	
CM_USI Code		NR_Payment Milestone	
CM_Milestone_Type		NR_Reporting Events	
CM_WP_Earning Rule		NR_CCD Number	
CM_Activity_Release_Gate		NR_LOE_Work	
CM_Unit			
CM_Vendor			
CM_Outage			

Note: Code names that start with NR don't mean they are only needed for Nuclear Refurb projects.

6. Identification of Critical Path

6.1 Critical Path Analysis and Schedule Contingency

<<Critical Path analysis summary, Total Float and Schedule Contingency >>

6.2 Work Packages on Critical Path

No.	WP ID	Critical Path WP Name	Duration	Critical or Near Critical (C or NC)
1				
2				

<< List all Work Packages that are on the Project Critical Path >>.

7. Earned Value Management Application

<<Summary of how the project applies Earned Value Management in this P6 Schedule, such as Activity Steps and Work Quantities used on Work Packages.

List all Work Packages with budgeted Value Units (including VUL, VUM and VUN) and the Earning Rules of Work Packages. P6 Layouts EP_JOBAID_QC28 can be used to generate Attachments.

Value Units profiles should be provided to reflect progress curves. If Work Quantities are available, then progress curves should reflect the Work Quantities>>

8. Resource Histograms with Identification of Availability

<< Brief analysis of recourse need, availability and resource leveling comment, supported with the P6 layout. EP_446_PROJ_L3_Labor_Resources_Profile as an Attachment.>>

9. Attachment

9.1 Project WBS Dictionary

<<SCOPE-TMP-001 WBS Dictionary>>

9.2 Project Level 0 Schedule

<<P6 Layout: EP_300_PROJ_Milestones >>

9.3 Project Leve1 1 Schedule

<<P6 Layout: EP_401_PROJ_L1 >>

9.4 Project Level 2 Schedule

<<P6 Layout: EP_420_PROJ_L2_SCH_WPs >>

9.5 Project Level 3 Schedule

<<P6 Layout: EP_440_PROJ_L3_SCH >>

9.6 Project Critical Path Schedule

<<P6 Layout: EP_441_PROJ_L3_CRITICAL PATH>>

9.7 Project Earned Value Management Implementation

<<P6 Layouts: EP_JOBAID_QC28_Work Package_Steps and EP_JOBAID_QC28_WP with Work Quantities if applicable >>

9.8 Project Level 3 Resource Profile

<<P6 Layout: EP_446_PROJ_L3_Labor_Resources_Profile >>

9.9 Project Schedule Quality Job-Aid

<<Template: Gate-Form-002 P6 Schedule Implementation – Job Aid >>

9.10 Project Acumen Fuse Report

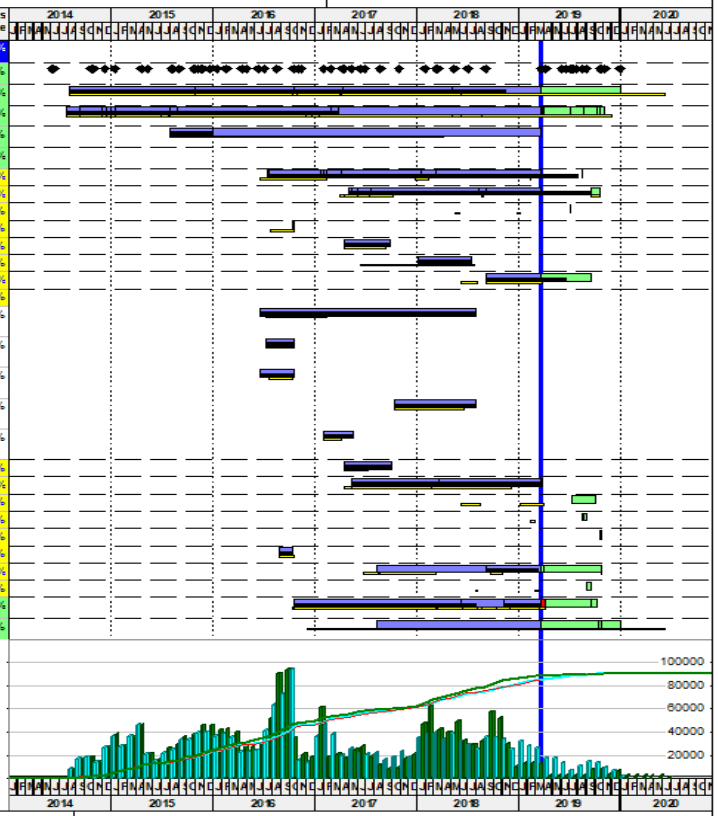
Appendix H: Project Lifecycle Schedule Progress Report

ONTARIO POWER GENERATION

Project Lifecycle Schedule Progress Report

Layout: NP_301_PROJ_L0/1/2
Data Date: 21.Mar.19
Page 1 of 1

Activity ID	Activity Name	Start	BL Start	Finish	BL Finish	BL HRS	Forecast HRS	PV HRS	EV HRS	SV HRS	SPI HRS	Physical Complete	Units Complete
73628 - U2 - Fire Protection Majo		5.Jun.14 A	5.Jun.14	30.Dec.19	8.Jun.20	91381	91385	88653	85100	-3552	0.96		93.13%
Milestones		5.Jun.14 A	5.Jun.14	30.Dec.19	8.Jun.20	0	0	0	0	0	0.00		0%
Project Management		8.Aug.14 A	8.Aug.14	30.Dec.19	8.Jun.20	18244	18248	16668	16684	17	1.00		91.45%
Engineering		24.Jul.14 A	24.Jul.14	6.Nov.19	29.Nov.19	32630	32630	32503	31956	-543	0.98		97.95%
Procurement		3.Aug.15 A	3.Aug.15	21.Mar.19	6.Apr.18	0	0	0	0	0	0.00		0%
Construction		21.Jun.16 A	21.Jun.16	24.Oct.19	24.Oct.19	37963	37953	37295	35742	-1553	0.96		94.17%
Pre-Reqs - Construction Support		15.Jul.16 A	21.Jun.16	15.Aug.19	14.Feb.19	4167	4167	4167	4074	-93	0.98		97.77%
Pre-Reqs - Construction Support - Segment 2		1.May.17 A	31.Mar.17	17.Oct.19	17.Oct.19	1181	1181	624	624	0	1.00		52.84%
Pre-Reqs - Construction Support - Segment 3		2.Jul.19	18.May.18	5.Jul.19	2.Jan.19	16	16	16	0	-16	0.00		0%
Construction Indirects - Pre BO		13.Oct.16 A	25.Jul.16	14.Oct.16 A	14.Oct.16	1125	1125	1125	1125	0	1.00		100%
Construction Indirects - Segment 1		18.Apr.17 A	17.Apr.17	29.Sep.17 A	12.Sep.17	231	231	231	231	0	1.00		100%
Construction Indirects - Segment 2		5.Jan.18 A	12.Jun.17	17.Jul.18 A	25.Jul.18	2014	2014	2014	2014	0	1.00		100%
Construction Indirects - Segment 3		4.Sep.18 A	11.Jun.18	18.Sep.19	27.Mar.19	4188	4188	4128	3208	-924	0.78		76.51%
EXECUTION - MULTIPLE SCOPES		21.Jun.16 A	8.Jul.16	31.Jul.18 A	22.Jun.18	9234	9234	9234	9234	0	1.00		100%
7362850100	PRE BO EXECUTION - MULTIPLE SCOPES	21.Jun.16 A	8.Jul.16	31.Jul.18 A	10.Feb.17	0	0	0	0	0	0.00	100%	0%
7362850101	Scope ID 7081 - CWP #7081-1 - Separations - MECH	8.Jul.16 A	8.Jul.16	14.Oct.16 A	14.Oct.16	3133	3133	3133	3133	0	1.00	100%	100%
7362850102	Scope ID 7081 - CWP #7081-2 - Separations - CIVIL	21.Jun.16 A	18.Jul.16	14.Oct.16 A	11.Oct.16	1133	1133	1133	1133	0	1.00	100%	100%
7362850103	Scope ID 7083 - CWP #7083-2 - Alarms - Unit 2	17.Oct.17 A	17.Oct.17	31.Jul.18 A	22.Jun.18	4134	4134	4134	4134	0	1.00	100%	100%
7362850104	Scope ID 7085 - CWP #7085-1 - Fault Isolation Modules - U2	31.Jan.17 A	1.Feb.17	19.May.17 A	4.Apr.17	834	834	834	834	0	1.00	100%	100%
SEGMENT 1 EXECUTION		18.Apr.17 A	17.Apr.17	4.Oct.17 A	7.Jul.17	940	940	940	940	0	1.00		100%
SEGMENT 2 EXECUTION - MULTIPLE SCOPE		11.May.17 A	17.Apr.17	28.Mar.19	5.Dec.18	11847	11847	11847	11746	-101	0.99		99.14%
SEGMENT 3 EXECUTION - Scope ID 7086 - E		11.Jul.19	11.Jun.18	2.Oct.19	29.Mar.19	348	348	307	0	-307	0.00		0%
SEGMENT 4 EXECUTION		16.Aug.19	15.Feb.19	29.Aug.19	1.Mar.19	0	0	0	0	0	0.00		0%
ON HOLD - Scope ID 7084 - Transformer Con		17.Oct.19	17.Oct.19	23.Oct.19	23.Oct.19	0	0	0	0	0	0.00		0%
Post-Reqs - Construction Support - Pre BO		29.Aug.16 A	29.Aug.16	13.Oct.16 A	21.Oct.16	1995	1995	1995	1995	0	1.00		100%
Post-Reqs - Construction Support - Segment		10.Aug.17 A	23.Jun.17	24.Oct.19	24.Oct.19	592	592	592	551	-41	0.93		93.07%
Post-Reqs - Construction Support - Segment		30.Aug.19	31.Jul.18	18.Sep.19	15.Mar.19	70	70	70	0	-70	0.00		0%
Commissioning		14.Oct.16 A	11.Oct.16	9.Oct.19	5.Apr.19	857	857	833	714	-118	0.86		83.31%
Close-out		15.Aug.17 A	6.Dec.16	30.Dec.19	8.Jun.20	1697	1697	1354	0	-1354	0.00		0%



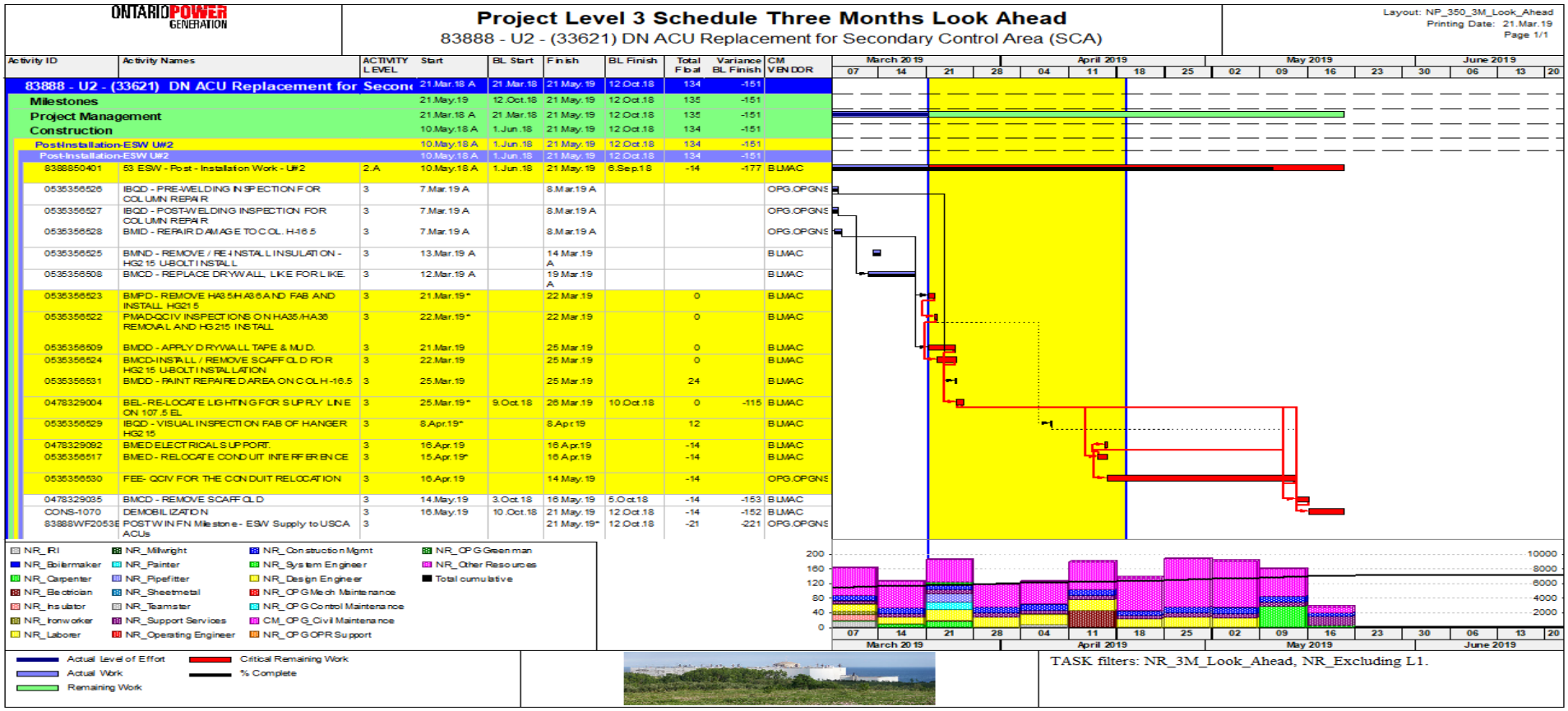
Units
- Budgeted Labor
- Planned Value Labor
- Earned Value Labor
- BL Project Labor

Project Baseline Bar
Actual Work
Remaining Work
Critical Remaining Work
Milestone
% Complete

TASK filter: NR_Excluding L3.

Note: For saving pages, only one Control Account is expanded in the diagram above. When submitting periodic reports, the entire schedule should be expanded to show all Level 0, Level 1 and Level 2 Activities.

Appendix I: Project Three Months Look Ahead Schedule



Note: (1) For saving pages, only one WP is expanded in the diagram above. When submitting periodic reports, all areas should be expanded to show all Level 0, Level 1 and Level 2 Activities; (2) Owner's Hold Point, Witness Point, and other Supporting Activities are required to be developed in Vendor's Level 3 schedule.

Appendix J: EPC Project Standard Earning Rules

Type 1: Progressing Physical % Complete by Major Work Quantities/Commodity Tracking

Total Labor Hours (VUL) and Major Work Quantities / Commodities are both loaded to the Work Package as P6 Resources. Comparing the Major Work Quantities / Commodities completed to the total budgeted, then *Physical % Complete* is obtained; and then, *Earned VUL = BL Budgeted VUL X Physical % Complete.* Below are examples,

Example 1: XXXXX50101 East Side Upper 240 End Fittings Removal

Item	Steps	Weights	Step % Complete	Complete	Notes
Step 1	Onsite Preparation	5%	100%	Y/N	If prep work is finished, check Y for ***Complete***
Step 2	Implementation of Major Work	90%	50%	Y/N	90% of VUL is distributed to 240 EFs. If 120/240 is removed, then ***Step % Complete=50%***
Step 3	Final and End of Erection Summary Report or Signature	5%	0	Y/N	

Example 2: XXXXX50101 System A - 100 Control Panels Periodic Inspections

Item	Steps	Weights	Step % Complete	Complete	Notes
Step 1	Onsite Preparation	5%	100%	Y/N	If prep work is finished, check Y for Complete
Step 2	Implementation of Major Work	90%	50%	Y/N	90% of VUL is distributed to 100 Panels. If 50/100 are inspected, then *Step % Complete*=50%
Step 3	Final and End of Erection Summary Report or Signature	5%	0	Y/N	

Type 2: Progressing Physical % Complete by Weighted Activity Steps

Total Labor Hours (VUL) is loaded to Work Packages. P6 Activity Steps t are assigned to a Work Package. Activity Steps templates can be used.

Below are examples of Steps Templates,

Example 3: XXXXX303XX Preliminary Engineering Package (MEC#)

Item	Steps	Weights	Complete	Notes
Step 1	Engineering Mobilization Complete	70%	Y/N	Check the Complete box, values are earned
Step 2	Preliminary Design Complete	30%	Y/N	

Example 4: XXXXX304XX Detailed Engineering Package (EC#)

Item	Steps	Weights	Complete	Notes
Step 1	Detailed Design Complete	40%	Y/N	Check the Complete box, values are earned
Step 2	Detailed Design Approved	45%	Y/N	
Step 3	DCAVR Complete	15%	Y/N	

Example 5: XXXXX307XX Work Plans Development Package (WP#)

Item	Steps	Weights	Complete	Notes
Step 1	Work Plan Submitted for Pre-Screen Review	60%	Y/N	Check the Complete box, values are earned
Step 2	Work Plan Submitted for OPG Stakeholder Review	20%	Y/N	
Step 3	Final Work Plan Submitted	10%	Y/N	
Step 4	Work Plan Issued	10%	Y/N	

Example 6: XXXXX307XX CWP Development (CWP#)

Item	Steps	Weights	Complete	Notes
Step 1	CWP/ITP Submitted	60%	Y/N	Check the Complete box, values are earned
Step 2	CWP/ITP TSSA Review Complete	10%	Y/N	
Step 3	Comments Dispositions	20%	Y/N	
Step 4	CWP Approved	10%	Y/N	

Example 7: XXXXX402XX OPG Procurement of Materials/Equipment/Components (PO#)

Item	Steps	Weights	Complete	Notes
Step 1	PO Planning Complete	10%	Y/N	Check the Complete box, values are earned
Step 2	PO RFQ Complete	10%	Y/N	
Step 3	PO Issued	40%	Y/N	
Step 4	ITP and Approval	30%	Y/N	
Step 5	Materials/Equipment/Components Received	10%	Y/N	

Example 8: XXXXX402XX OPG Procurement of EPC Contracts (Contract#)

Item	Steps	Weights	Complete	Notes
Step 1	Contract Planning	20%	Y/N	Check the Complete box, values are earned
Step 2	Contract RFQ	30%	Y/N	
Step 3	Contract Awarded	50%	Y/N	

Example 9: XXXXX405XX / XXXXX406XX Vendors Procurement Package (PO#)

Item	Steps	Weights	Complete	Notes
Step 1	PO Planning and Bill of Materials Identified	10%	Y/N	Check the Complete box, values are earned
Step 2	PO RFQ	10%	Y/N	
Step 3	PO Issued	40%	Y/N	
Step 4	ITP & Approval	30%	Y/N	
Step 5	Materials/Products Accepted	10%	Y/N	

Example 10: XXXXX407XX Vendor's Fabrication/Manufacturing

Item	Steps	Weights	Complete	Notes
Step 1	Designs and Plans Ready	10%	Y/N	Check the Complete box, values are earned
Step 2	Materials Staged	10%	Y/N	
Step 3	Fabrication Finished	40%	Y/N	
Step 4	All Tests Finished	25%	Y/N	
Step 5	Owner's Inspections Complete	10%	Y/N	
Step 6	Product Ready for Delivery	5%	Y/N	

Example 11: XXXXX5XXXX Replacement of Rotating Equipment/Components (PO#)

Item	Steps	Weights	Complete	Notes
Step 1	New Component On Site	5%	Y/N	Check the Complete box, values are earned
Step 2	Old Component Removed from System	15%	Y/N	
Step 3	New Components in Position for Connection	10%	Y/N	
Step 4	Adjustment, Alignment and Connection to System	50%	Y/N	
Step 5	Accessories Installation and Final Inspection	10%	Y/N	
Step 6	End of Erection Summary Report	10%	Y/N	

Example 12: XXXXX5XXXX Replacement of Non-Rotating Equipment/Components

Item	Steps	Weights	Complete	Notes
Step 1	New Component On Site	15%	Y/N	Check the Complete box, values are earned
Step 2	Old Component Removed from System	20%	Y/N	
Step 3	New Components in Position for Connection	15%	Y/N	
Step 4	Adjustment, Alignment and Connection to System	30%	Y/N	
Step 5	Accessories Installation and Final Inspection	10%	Y/N	
Step 6	End of Erection Summary Report	10%	Y/N	

Example 13: XXXXX5XXXX Onsite Tank Installation

Item	Steps	Weights	Complete	Notes
Step 1	Tank Base Installation Complete	10%	Y/N	Check the Complete box, values are earned
Step 2	Tank Body Installation Complete	60%	Y/N	
Step 3	Tank Top/Cap Installation Complete	10%	Y/N	
Step 4	Accessories Installation Complete	10%	Y/N	
Step 5	Hydro/Sealing Test Complete	5%	Y/N	
Step 6	End of Erection Summary Report	5%	Y/N	

Example 14: XXXXX5XXXX Pipe Installation

Item	Steps	Weights	Complete	Notes
Step 1	In Position and Alignment	30%	Y/N	Check the Complete box, values are earned
Step 2	Welding Complete	35%	Y/N	
Step 3	Non Destructive Test Complete	15%	Y/N	

Step 4	Hydro/Sealing Test	15%	Y/N	
Step 5	End of Erection Summary Report	5%	Y/N	

Example 15: XXXXX5XXXX High Temperature Pipe Insulation Installation

Item	Steps	Weights	Complete	Notes
Step 1	Insulation Installation Complete	40%	Y/N	Check the Complete box, values are earned
Step 2	Insulation Out Shell Installation Complete	40%	Y/N	
Step 3	End of Erection Summary Report	20%	Y/N	

Example 16: XXXXX5XXXX Low Temperature Pipe Insulation Installation

Item	Steps	Weights	Complete	Notes
Step 1	Insulation Installation Complete	60%	Y/N	Check the Complete box, values are earned
Step 2	Insulation Out Shell Installation Complete	20%	Y/N	
Step 3	End of Erection Summary Report	20%	Y/N	

Example 17: XXXXX5XXXX Cranes Installation

Item	Steps	Weights	Complete	Notes
Step 1	Installation Complete	70%	Y/N	Check the Complete box, values are earned
Step 2	Load Test Complete	20%	Y/N	
Step 3	End of Erection Summary Report	10%	Y/N	

Example 18: XXXXX5XXXX Construction Completion Declaration Package

Item	Steps	Weights	Complete	Notes
Step 1	Joint Walk-down Complete	10%	Y/N	Check the Complete box, values are earned
Step 2	Open Items Identified	30%	Y/N	
Step 3	CCD Submitted	40%	Y/N	
Step 4	CCD Approved	20%	Y/N	

Example 19: XXXXX6XXXX Simple MOD - Return to Service Package

Item	Steps	Weights	Complete	Notes
Step 1	Dynamic Testing Complete	30%	Y/N	Check the Complete box, values are earned
Step 2	MOD AFS Walk-down Complete	10%	Y/N	
Step 3	MOD AFS Package Prepared	40%	Y/N	
Step 4	MOD AFS Complete	20%	Y/N	

Example 20: XXXXX6XXXX Complex MOD - Return to Service Package

Item	Steps	Weights	Complete	Notes
Step 1	Dynamic Testing Complete	15%	Y/N	Check the Complete box, values are earned
Step 2	MOD AFS Walk-down Complete	5%	Y/N	
Step 3	MOD AFS Package Prepared	20%	Y/N	
Step 4	MOD AFS Complete	10%	Y/N	
Step 5	System Testing Complete	15%	Y/N	
Step 6	System AFS Walk-down Complete	5%	Y/N	
Step 7	System AFS Package Prepared	20%	Y/N	
Step 8	System AFS Complete	10%	Y/N	

Example 21: XXXXX6XXXX Non Mod - Return to Service Package

Item	Steps	Weights	Complete	Notes
Step 1	System Testing Complete	30%	Y/N	Check the Complete box, values are earned
Step 2	System AFS Walk-down Complete	10%	Y/N	
Step 3	System AFS Package Prepared	40%	Y/N	
Step 4	System AFS Complete	20%	Y/N	

Example 22: XXXXX903XX Administrative Closeout Package

Item	Steps	Weights	Complete	Notes
Step 1	Open Items Dispositioned	30%	Y/N	Check the Complete box, values are earned
Step 2	Documents and Drawings Submitted	10%	Y/N	
Step 3	Documents Issued to AS7	40%	Y/N	
Step 4	EC and MEC Closeout Complete	20%	Y/N	

Example 23: XXXXX904XX Project Closeout Package

Item	Steps	Weights	Complete	Notes
Step 1	Vendor Complete All Open Items, Work Orders and Documents	30%	Y/N	
Step 2	Vendor Submitted Final Invoice	10%	Y/N	Check the Complete box, values are earned
Step 3	OPG Project Team Complete Project Closeout Report	40%	Y/N	
Step 4	OPG Final PIR Review Complete	20%	Y/N	