



September 26, 2014

TO: Distribution

FROM: Associate Administrator

SUBJECT: Guidance and Expectations for Small Category 3, Risk Classification D (Cat3/ClassD) Space Flight Projects with Life-Cycle Cost Under \$150M

The intent of this letter is to provide guidance and expectations in applying project management requirements to small Cat3/ClassD space flight projects with a life-cycle cost (LCC) under \$150M. NASA policy recognizes the need to accommodate the unique aspects of each program or project to achieve mission success in a safe, efficient, and economical manner within acceptable risk. This flexibility is achieved through tailoring as per NPR 7120.5E and the risk classification guidance per NPR 8705.4.

Tailoring is both an expected and accepted part of establishing proper requirements for all category and class projects and especially so for small Cat3/ClassD projects. History has shown, however, that tailoring is not being implemented throughout the Agency. Projects are diverse and Agency leaders should assess each project on a case-by-case basis and look for tailoring opportunities to reduce unnecessary burden on projects. Tailoring is enabled by NASA policy and is especially necessary for these small projects to align requirement implementation to project scope, mitigate application of over rigorous or unnecessary requirements, and reduce burden on small projects with limited resources. Centers, Mission Directorates (MD), and support offices are expected to support the projects in tailoring and encourage them to review their own practices and provide similar clarification, scoping, and/or relief from unnecessary requirements.

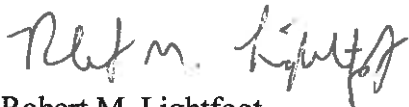
Following are general guidelines and expectations for small Cat3/ClassD space flight projects with a LCC under \$150M (from here on referred to as small Cat3 projects) based on the 7120.5E compliance matrix. The attached compliance matrix provides a requirement-by-requirement clarification and guidance on tailoring flexibility.

- Implementing Centers/projects are expected to propose innovative and streamlined implementation approaches for these missions.
- Most project products (e.g., control plans) may be included as sections of the project plan, or may be a different format other than a separate text document. The products are to be configuration controlled, used by the project to do its work with sufficient content for life-cycle and independent reviews.

- Projects may propose a tailored life-cycle review plan and obtain approval from the Decision Authority (DA) to implement. The review plan may include combining, omitting, or applying agile approach to the reviews, as approved by the DA.
- An Independent Review Team is used to perform independent assessments of the project in place of an IPAO Standing Review Board (SRB). The independent review team must be independent of the project as defined in the SRB Handbook (Appendix A).
- Governance is consistent with 7120.5E and the recent delegation of authority decision at the March 2014 APMC. Mission Directorate Associate Administrators will consider delegation of decision authority of small Cat3 projects at each Key Decision Point (KDP). The projects may propose delegation for MD consideration.
- Earned Value Management (EVM) principles for small projects may be applied as per the attached EVM guide and used for in-house small Cat3 projects with development costs greater than \$20M and a LCC estimate below \$150M.
- Joint Confidence Level and External Cost and Schedule Commitments (ABC external commitment) are not applicable to small Cat3 projects with a LCC below \$150M. Small Cat3 projects are required to develop a NASA internal cost and schedule commitment (ABC internal commitment).
- Cost Analysis Data Requirement (CADRe) is not mandatory, but data collection for smaller projects is critical for future estimating capabilities and is strongly encouraged.

The desired project outcome is for an approved tailoring and implementation approach allowing innovation while maintaining programmatic performance against plan within acceptable risk. Through experience gained in implementation of tailoring for the small Cat3 projects, the Agency will assess future potential policy changes.

To assist guidance and expectations in implementing this letter, a copy and referenced attachments will be linked from the NPR 7120.5 in the NODIS Library to the NODIS OCE Tab.



Robert M. Lightfoot

2 Enclosure

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
2.1.1	Regardless of the structure of a program or project meeting the criteria of Section P.2, this NPR shall apply to the full scope of the program or project and all the activities under it.	Regardless of the structure of a program or project meeting the criteria of Section P.2, this NPR shall apply to the full scope of the program or project and all the activities under it.	No Change.
2.1.4.1	Projects are Category 1, 2, or 3 and shall be assigned to a category based initially on: (1) the project life-cycle cost (LCC) estimate, the inclusion of significant radioactive material, and whether or not the system being developed is for human space flight; and (2) the priority level, which is related to the importance of the activity to NASA, the extent of international participation (or joint effort with other government agencies), the degree of uncertainty surrounding the application of new or untested technologies, and spacecraft/payload development risk classification.	Projects are Category 1, 2, or 3 and shall be assigned to a category based initially on: (1) the project life-cycle cost (LCC) estimate, the inclusion of significant radioactive material, and whether or not the system being developed is for human space flight; and (2) the priority level, which is related to the importance of the activity to NASA, the extent of international participation (or joint effort with other government agencies), the degree of uncertainty surrounding the application of new or untested technologies, and spacecraft/payload development risk classification.	Addition of a small CAT 3 for implementation guidance.
2.1.4.1	When projects are initiated, they are assigned to a NASA Center or implementing organization by the MDAA consistent with direction and guidance from the strategic planning	When projects are initiated, they are assigned to a NASA Center or implementing organization by the MDAA consistent with direction and guidance from the strategic planning	No change.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
	process. They are either assigned directly to a Center by the Mission Directorate or are selected through a competitive process such as an Announcement of Opportunity (AO). For Category 1 projects, the assignment shall be with the concurrence of the NASA AA.	process. They are either assigned directly to a Center by the Mission Directorate or are selected through a competitive process such as an Announcement of Opportunity (AO). For Category 1 projects, the assignment shall be with the concurrence of the NASA AA.	
2.2.1	Programs and projects shall follow their appropriate life cycle, which includes life-cycle phases; life-cycle gates and major events, including KDPs; major life-cycle reviews (LCRs); principal documents that govern the conduct of each phase; and the process of recycling through Formulation when program changes warrant such action.	Programs and projects shall follow their appropriate life cycle, which includes life-cycle phases; life-cycle gates and major events, including KDPs; major life-cycle reviews (LCRs); principal documents that govern the conduct of each phase; and the process of recycling through Formulation when program changes warrant such action.	No change.
2.2.2	Each program and project performs the work required for each phase, which is described in the NASA Space Flight Program and Project Management Handbook and NPR 7123.1. This work shall be organized by a product-based WBS developed in accordance with the Program and Project Plan templates (appendices G and H).	Each program and project performs the work required for each phase, which is described in the NASA Space Flight Program and Project Management Handbook and NPR 7123.1. This work shall be organized by a product-based WBS developed in accordance with the Program and Project Plan templates (appendices G and H).	No change.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
2.2.3	The documents shown on the life-cycle figures and described below shall be prepared in accordance with the templates in appendices D, E, F, G, and H.	The documents shown on the life-cycle figures and described below shall be prepared in accordance with the templates in appendices D, E, F, G, and H.	<p>The 5 documents related to 2.2.3 (with templates in appendices) include FAD, PCA, Program Plan, Formulation Agreement (FA) and Project Plan. The only 2 documents that project is responsible to produce are the FA and the Project Plan. The FAD is a Mission Directorate (MD) document; the PCA is a NASA AA document prepped by MD, and the Program Plan is prepared by the Program Manager. The two project docs: FA and Project Plan, layout out plan on how project will execute formulation and implementation.</p> <p>The project has option to propose approach on how they plan to document (aka tailor) the formulation plan (e.g. FA) and Project Plan. The proposed plan with rationale is communicated to DA for approval.</p> <p>Example: The project may propose to produce an early Project Plan to cover work in formulation in lieu of a FA and update the Project Plan for the work they plan to do in implementation.</p>

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
2.2.4	Each program and project shall perform the LCRs identified in its respective figure in accordance with NPR 7123.1, applicable Center practices, and the requirements of this document.	Each program and project shall perform the LCRs identified in its respective figure in accordance with NPR 7123.1, applicable Center practices, and the requirements of this document. Project proposes review plan to DA for approval.	DA will decide reviews, captured in para 2.3.1 below. Project may propose review plan to DA for approval. The project may propose alternate approach (aka tailored), for example, may propose combining or eliminating reviews. This information is communicated with rationale to DA for approval.
2.2.5	The program or project and an independent Standing Review Board (SRB) shall conduct the SRR, SDR/MDR, PDR, CDR, SIR, ORR, and PIR LCRs in figures 2-2, 2-3, 2-4, and 2-5.	The program or project and an independent Standing Review Board (SRB) shall conduct the SRR, SDR/MDR, PDR, CDR, SIR, ORR, and PIR LCRs in figures 2-2, 2-3, 2-4, and 2-5. For small CAT 3, substitute an independent review team for the SRB.	For small CAT 3 in lieu of a SRB, an independent assessment is conducted by an independent review team (IRT) convened by the Convening Authorities (MDAA, DA and Center Director) as agreed to by the program and project; consistent with the approved project review plan.
2.2.5.1	The Conflict of Interest (COI) procedures detailed in the NASA Standing Review Board Handbook shall be strictly adhered to.	The Conflict of Interest (COI) procedures detailed in the NASA Standing Review Board Handbook shall be strictly adhered to.	No change.
2.2.5.2	The portion of the LCR conducted by the SRB shall be convened by the Convening Authorities in accordance with Table 2-2.	The portion of the LCR conducted by the SRB shall be convened by the Convening Authorities in accordance with Table 2-2.	For small CAT 3 – IRT will conduct all LCR reviews convened by the Convening Authorities (see 2.2.5).

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
2.2.5.3	The program or project manager, the SRB chair, and the Center Director (or designated Engineering Technical Authority representative) shall mutually assess the program or project's expected readiness for the LCR and report any disagreements to the Decision Authority for final decision.	The program or project manager, the SRB chair (IRT chair for small CAT 3) and the Center Director (or designated Engineering Technical Authority representative) shall mutually assess the program or project's expected readiness for the LCR and report any disagreements to the Decision Authority for final decision.	Independent Review Team is used in place of an SRB.
2.2.6	In preparation for these LCRs, the program or project shall generate the appropriate documentation per the Appendix I tables of this document, NPR 7123.1, and Center practices, as necessary, to demonstrate that the program's or project's definition and associated plans are sufficiently mature to execute the follow-on phase(s) with acceptable technical, safety, and programmatic risk.	In preparation for these LCRs, the program or project (CAT 1, 2 and 3) shall generate the appropriate documentation per the Appendix I tables of this document, NPR 7123.1, and Center practices, as necessary, to demonstrate that the program's or project's definition and associated plans are sufficiently mature to execute the follow-on phase(s) with acceptable technical, safety, and programmatic risk. [For small CAT 3, the project shall generate documents supported with objective evidence as approved by the DA to proceed to the next phase.]	For small CAT 3, in preparation for the LCR, the project shall only be required to generate documents supported with objective evidence as approved by the DA which demonstrates the project's readiness to proceed to the next phase with acceptable technical, safety, and programmatic risk. During upfront planning, the project proposes the documents/formats and obtains approval by DA, and documents the approved plan.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	7120.5 Requirement w/small CAT 3	Implementation Guidance
Table 1-4 - Project Milestone Products Maturity Matrix:			
1.	FAD [Baseline at MCR]		FAD is produced by Mission Directorate or Program. Project does not produce the FAD but must align to it in their formulation planning.
2.	Program Plan [Baseline at MCR]		Program Plan is produced by the Program. Project does not produce this Program Plan but must align to it in their project planning.
2.a	Applicable Agency strategic goals [Baseline at MCR]	Applicable Agency strategic goals [Baseline at MCR]	No Change: All programs and project must be able to trace to the Agency Strategic Plan. This is normally documented and flowed down through FAD, PCA, Program Plan, FA and Project Plan to show traceability to the goals and objectives in the Agency Strategic Plan.
2.b	Documentation of program-level requirements and constraints on the project (from the Program Plan) and stakeholder expectations, including mission objectives/goals and mission success criteria [Baseline at SRR]	Documentation of program-level requirements and constraints on the project (from the Program Plan) and stakeholder expectations, including mission objectives/goals and mission success criteria [Baseline at SRR]	No change.
2.c	Documentation of driving mission, technical, and programmatic ground rules and assumptions [Baseline at SDR/MDR]	Documentation of driving mission, technical, and programmatic ground rules and assumptions [Baseline at SDR/MDR]	No change.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	7120.5 Requirement w/small CAT 3	Implementation Guidance
3.	Partnerships and interagency and international agreements [Baseline U.S. partnerships and agreements at SDR/MDR; Baseline International agreements at PDR]	Partnerships and interagency and international agreements [Baseline U.S. partnerships and agreements at SDR/MDR; Baseline International agreements at PDR]	No change.
4.	ASM minutes	ASM minutes (N/A small CAT 3)	N/A small CAT 3.
5.	NEPA compliance documentation per NPR 8580.1	NEPA compliance documentation per NPR 8580.1	No change
6.	Mishap Preparedness and Contingency Plan [Baseline at SMSR] [per NPR 8621.1]	Mishap Preparedness and Contingency Plan [Baseline at SMSR] [per NPR 8621.1]	No change.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	7120.5 Requirement w/small CAT 3	Implementation Guidance
<p>Note 1: Most of the small CAT 3 project products, as applicable and tailored to the project, may be included as sections on the Project Plan, or may be a different format other than a separate document. This may include configuration controlled presentation slides, spread sheets, or similar. It should be the documentation the project uses to do its work and is sufficient for review by the Independent Review Team. Following is the list of Tables I-4 and I-5 products and the Implementation Guidance column provides further information referencing this note and identifies standalone products.</p>			
Table 1-4 - Project Technical Products			
1.	Concept Documentation [Approved at MCR]	Concept Documentation [Approved at MCR] (No change for small CAT 3)	No change. Refer to Note 1.
2.	Mission, Spacecraft, Ground, and Payload Architectures [Baseline mission and spacecraft architecture at SRR; Baseline ground and payload architectures at SDR/MDR]	Mission, Spacecraft, Ground, and Payload Architectures [Baseline mission and spacecraft architecture at SRR; Baseline ground and payload architectures at SDR/MDR] (No change for small CAT 3)	No change. Refer to Note 1.
3.	Project-Level, System, and Subsystem Requirements [Baseline project-level and system-level requirements at SRR; Baseline subsystem requirements at PDR],	Project-Level, System, and Subsystem Requirements [Baseline project-level and system-level requirements at SRR; Baseline subsystem requirements at PDR], (No change for small CAT 3)	No change Refer to Note 1.
4.	Design Documentation [Baseline Preliminary Design at PDR; Baseline Detailed Design at CDR; Baseline As-built hardware and software at MRR/FRR],	Design Documentation [Baseline Preliminary Design at PDR; Baseline Detailed Design at CDR; Baseline As-built hardware and software at MRR/FRR], (No change for small CAT 3)	No change. Refer to Note 1.
5.	Operations Concept [Baseline at PDR],	Operations Concept [Baseline at PDR], (No change for small CAT 3)	No change. Refer to Note 1.
6.	Technology Readiness Assessment	Technology Readiness Assessment	No change.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	7120.5 Requirement w/small CAT 3	Implementation Guidance
	Documentation ,	Documentation , (No change for small CAT 3)	Refer to Note 1.
7.	Engineering Development Assessment Documentation,	Engineering Development Assessment Documentation, (No change for small CAT 3)	No change. Refer to Note 1.
8.	Heritage Assessment Documentation,	Heritage Assessment Documentation, (No change for small CAT 3)	No change. Refer to Note 1.
9.	Safety Data Packages [Baseline at CDR] [per NPRs 8715.3, 8735.1, and 8735.2],	Safety Data Packages [Baseline at CDR] [per NPRs 8715.3, 8735.1, and 8735.2], (No change for small CAT 3)	No change. Standalone document per compliance with Safety Data Package requirements.
10.	ELV Payload Safety Process Deliverables [Baseline at SIR] [per NPR 8715.7],	ELV Payload Safety Process Deliverables [Baseline at SIR] [per NPR 8715.7], (No change for small CAT 3)	No change. Standalone document per compliance with ELV Payload Safety Process Deliverables requirements.
11.	Verification and Validation Report [Baseline at MRR/FRR],	Verification and Validation Report [Baseline at MRR/FRR], (No change for small CAT 3)	No change. Refer to Note 1.
12.	Operations Handbook [Baseline at ORR],	Operations Handbook [Baseline at ORR], (No change for small CAT 3)	No change. Refer to Note 1.
13.	Orbital Debris Assessment Report [Final at SMSR] [per NPR 8715.6],	Orbital Debris Assessment Report [Final at SMSR] [per NPR 8715.6], (No change for small CAT 3)	No change. Standalone document per compliance with Orbital Debris Assessment Report requirements.
14.	End of Mission Plans per NPR 8715.6/NASA-STD 8719.14, App B [Baseline at SMSR],	End of Mission Plans per NPR 8715.6/NASA-STD 8719.14, App B [Baseline at SMSR], (No change for small CAT 3)	No change. Standalone document per compliance with End of Mission Plans requirements.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	7120.5 Requirement w/small CAT 3	Implementation Guidance
15.	Mission Report	Mission Report (No change for small CAT 3)	No change. Refer to Note 1

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
Table 1-4 - Project Management, Planning, and Control Products:			
1.	Formulation Agreement [Baseline for Phase A at MCR; Baseline for Phase B at SDR/MDR],	Formulation Agreement [Baseline for Phase A at MCR; Baseline for Phase B at SDR/MDR], (No change for small CAT 3)	No change Standalone document covering FA content topics as applicable and tailored to the project.
2.	Project Plan [Baseline at PDR],	Project Plan [Baseline at PDR],	No change. Standalone document covering Project Plan content topics as applicable and tailored to the project
3.	Plans for work to be accomplished during next Implementation life-cycle phase [Baseline for Phase Cat PDR; Baseline for Phase D at SIR; Baseline for Phase E at MRR/FRR; Baseline for Phase F at DR]	Plans for work to be accomplished during next Implementation life-cycle phase [Baseline for Phase Cat PDR; Baseline for Phase D at SIR; Baseline for Phase E at MRR/FRR; Baseline for Phase F at DR]	No change. Refer to Note 1
4.	Documentation of performance against Formulation Agreement (see #1 above) or against plans for work to be accomplished during Implementation life-cycle phase (see #3 above), including performance against baselines and status/closure of formal actions from previous KDP,	Documentation of performance against Formulation Agreement (see #1 above) or against plans for work to be accomplished during Implementation life-cycle phase (see #3 above), including performance against baselines and status/closure of formal actions from previous KDP. (For small CAT 3 – only documentation of performance against plans, including performance against baselines is required.)	No change. Documentation of performance against the project documented plans they established for formulation and implementation including performance against baselines.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
5.	Project Baselines [Baseline at PDR],	Project Baselines [Baseline at PDR],	No change. Refer to Note 1
5.a	Top technical, cost, schedule and safety risks, risk mitigation plans, and associated resources.	Top technical, cost, schedule and safety risks, risk mitigation plans, and associated resources,	No change. Refer to Note 1
5.b	Staffing requirements and plans.	Staffing requirements and plans,	No change. Refer to Note 1
5.c	Infrastructure requirements and plans, business case analysis for infrastructure Alternative Future Use Questionnaire (NASA Form 1739), per NPR 9250.1 [Baseline for NF 1739 Section A at SDR/MDR; Baseline for NF 1739 Section B at PDR],	Infrastructure requirements and plans, business case analysis for infrastructure Alternative Future Use Questionnaire (NASA Form 1739), per NPR 9250.1 [Baseline for NF 1739 Section A at SDR/MDR; Baseline for NF 1739 Section B at PDR],	No change. Refer to Note 1
5.d	Schedule [Baseline Integrated Master Schedule at PDR],	Schedule [Baseline Integrated Master Schedule at PDR],	No change. Refer to Note 1
5.e	Cost Estimate (Risk-Informed or Schedule-Adjusted Depending on Phase) [Baseline at PDR],	Cost Estimate (Risk-Informed or Schedule-Adjusted Depending on Phase) [Baseline at PDR],	No change. Refer to Note 1
5.f	Basis of Estimate (cost and schedule)	Basis of Estimate (cost and schedule) (No change for small CAT 3)	No change. Refer to Note 1 Project documents basis/explanation on how they determined the project cost estimate.
5.g	Joint Cost and Schedule Confidence Level(s) and supporting documentation [Baseline at PDR]	Joint Cost and Schedule Confidence Level(s) and supporting documentation [Baseline at PDR] (N/A small CAT 3)	N/A small CAT 3 (not required)
5.h	External Cost and Schedule	External Cost and Schedule	N/A small CAT 3 (not required but

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
	Commitments [Baseline at PDR],	Commitments [Baseline at PDR] (N/A small CAT 3),	does have internal cost and schedule commitments)
5.i	CADRe [Baseline at PDR],	CADRe [Baseline at PDR] (N/A small CAT 3)	N/A small CAT 3. Although small CAT3 projects don't have to do a CADRe, request they voluntarily share documentation with the CAD (i.e., not produce anything new, just share existing documentation).
6	Decommissioning/Disposal Plan [Baseline at DR]	Decommissioning/Disposal Plan [Baseline at DR]	No change. Refer to Note 1

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
Table 1 - Project Plan Control Plans Maturity Matrix:			
1.	Technical, Schedule, and Cost Control Plan [Baseline at SDR/MDR],	Technical, Schedule, and Cost Control Plan [Baseline at SDR/MDR],	No change Refer to Note 1
2.	Safety and Mission Assurance Plan [Baseline at SRR] [per NPDs 8730.5 and 8720.1, NPRs 8715.3, 8705.2, 8705.6, and 8735.2, and NASA Stds 8719.13 and 8739.8],	Safety and Mission Assurance Plan [Baseline at SRR] [per NPDs 8730.5 and 8720.1, NPRs 8715.3, 8705.2, 8705.6, and 8735.2, and NASA Stds 8719.13 and 8739.8],	No change Refer to Note 1.
3.	Risk Management Plan [Baseline at SRR] [per NPR 8000.4],	Risk Management Plan [Baseline at SRR] [per NPR 8000.4],	No change Refer to Note 1.
4.	Acquisition Plan [Baseline at SRR],	Acquisition Plan [Baseline at SRR], (No change for small CAT 3)	No change Refer to Note 1
5.	Technology Development Plan (may be part of Formulation Agreement) [Baseline at MCR] [per NPD 7500.2 and NPR 7500.1],	Technology Development Plan (may be part of Formulation Agreement) [Baseline at MCR] [per NPD 7500.2 and NPR 7500.1], (No change for small CAT 3)	No change Refer to Note 1
6.	Systems Engineering Management Plan [Baseline at SRR],	Systems Engineering Management Plan [Baseline at SRR], (No change for small CAT 3)	No change Refer to Note 1
7.	Information Technology Plan [Baseline at SDR/MDR] [NPDs 2200.1 and 1440.6 and NPRs 2200.2, 1441.1, 2800.1, and 2810.1],	Information Technology Plan [Baseline at SDR/MDR] [NPDs 2200.1 and 1440.6 and NPRs 2200.2, 1441.1, 2800.1, and 2810.1], (No change for small CAT 3)	No change Refer to Note 1
8.	Software Management Plan(s) [Baseline at SDR/MDR] [per NPR 7150.2 and NASA-STD-8739.8],	Software Management Plan(s) [Baseline at SDR/MDR] [per NPR 7150.2 and NASA-STD-8739.8], (No change for small CAT 3)	No change Refer to Note 1

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
9.	Verification and Validation Plan [Baseline at PDR],	Verification and Validation Plan [Baseline at PDR], (No change for small CAT 3)	No change Refer to Note 1
10.	Review Plan [Baseline at SRR],	Review Plan [Baseline at SRR], (No change for small CAT 3)	No change Refer to Note 1
11.	Mission Operations Plan [Baseline at ORR],	Mission Operations Plan [Baseline at ORR], (No change for small CAT 3)	No change Refer to Note 1
12.	Environmental Management Plan [Baseline at SDR/MDR] [per NPR 8580.1],	Environmental Management Plan [Baseline at SDR/MDR] [per NPR 8580.1], (No change for small CAT 3)	No change Documented per Environmental Management Plan requirements or can use OSI provided check list (copy on NEN PM CoP, 7120.5 link)
13.	Integrated Logistics Support Plan [Baseline at PDR] [per NPD 7500.1],	Integrated Logistics Support Plan [Baseline at PDR] [per NPD 7500.1], (No change for small CAT 3)	No change Refer to Note 1
14.	Science Data Management Plan [Baseline at ORR] [per NPD 2200.1 and NPRs 2200.2 and 1441.1],	Science Data Management Plan [Baseline at ORR] [per NPD 2200.1 and NPRs 2200.2 and 1441.1], (No change for small CAT 3)	No change Refer to Note 1
15.	Integration Plan [Baseline at PDR],	Integration Plan [Baseline at PDR], (No change for small CAT 3)	No change Refer to Note 1
16.	Configuration Management Plan [Baseline at SRR],	Configuration Management Plan [Baseline at SRR], (No change for small CAT 3)	No change Refer to Note 1

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
17.	Security Plan [Baseline at PDR] [per NPD 1600.2 and NPRs 1600.1 and 1040.1],	Security Plan [Baseline at PDR] [per NPD 1600.2 and NPRs 1600.1 and 1040.1], (No change for small CAT 3)	No change Refer to Note 1
18.	Project Protection Plan [Baseline at PDR],	Project Protection Plan [Baseline at PDR], (No change for small CAT 3)	No change. Standalone document per compliance with Project Protection Plan requirements
19.	Technology Transfer (formerly Export) Control Plan [Baseline at PDR] [per NPR 2190.1],	Technology Transfer (formerly Export) Control Plan [Baseline at PDR] [per NPR 2190.1], (No change small CAT 3)	No change If project has anything related to Export Control, will need to comply per Tech Transfer requirements.
20.	Lessons Learned Plan [Baseline at PDR] [per NPD 7120.4 and NPR 7120.6],	Lessons Learned Plan [Baseline at PDR] [per NPD 7120.4 and NPR 7120.6], (No change for small CAT 3)	No change Refer to Note 1.
21.	Human Rating Certification Package [Initial at SRR; certified at MRR/FRR] [per NPR 8705.2],	Human Rating Certification Package [Initial at SRR; certified at MRR/FRR] [per NPR 8705.2], (No change for small CAT 3)	No change Only required if applicable. If applicable to project, documented in compliance with Human Rating Certification Package requirements.
22.	Planetary Protection Plan [Baseline at PDR] [per NPD 8020.7 and NPR 8020.12],	Planetary Protection Plan [Baseline at PDR] [per NPD 8020.7 and NPR 8020.12], (No change for Small CAT 3)	No change Only required if applicable. If applicable to project, documented in compliance with Planetary Protection requirements
23.	Nuclear Safety Launch Approval Plan [Baseline at SDR/MDR] [per NPR 8715.3],	Nuclear Safety Launch Approval Plan [Baseline at SDR/MDR] [per NPR 8715.3], (No change for small CAT 3)	No change. Only required if applicable. to project, documented in compliance with Nuclear Safety Launch Approval Plan requirements

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
24.	Range Safety Risk Management Process Documentation [Baseline at SIR] [per NPR 8715.5],	Range Safety Risk Management Process Documentation [Baseline at SIR] [per NPR 8715.5], (No change for small CAT 3)	No change
25.	Education Plan [Baseline at PDR],	Education Plan [Baseline at PDR],	At project’s discretion.
26.	Communications Plan [Baseline at PDR]	Communications Plan [Baseline at PDR]	At project’s discretion.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
2.2.8	Projects in phases C and D (and programs at the discretion of the MDAA) with a life-cycle cost estimated to be greater than \$20 million and Phase E project modifications, enhancements, or upgrades with an estimated development cost greater than \$20 million shall perform earned value management (EVM) with an EVM system that complies with the guidelines in ANSI/EIA-748, Standard for Earned Value Management Systems.	Projects in phases C and D (and programs at the discretion of the MDAA) with a life-cycle cost estimated to be greater than \$20 million and Phase E project modifications, enhancements, or upgrades with an estimated development cost greater than \$20 million shall perform earned value management (EVM) with an EVM system that complies with the guidelines in ANSI/EIA-748, Standard for Earned Value Management Systems. <i>For small CAT 3, EVM principles, per the attached EVM guide, will be used for in-house small scale Cat 3 space flight projects with life-cycle cost projected to be below \$150M.</i>	EVM plans will be incorporated into the Project Plan, where applicable. <ul style="list-style-type: none"> • EVM principles, per the attached EVM guide, will be used for in- house small scale Cat 3 space flight projects with life-cycle cost projected to be below \$150M.
2.2.8.1	EVM system requirements shall be applied to appropriate suppliers, in accordance with the NASA Federal Acquisition Regulation (FAR) Supplement, and to in-house work elements.	EVM system requirements shall be applied to appropriate suppliers, in accordance with the NASA Federal Acquisition Regulation (FAR) Supplement, and to in-house work elements. (For small CAT 3 this requirement is limited to development contracts projected to exceed \$50M and to in-house work elements projected to exceed \$100M LCC.)	EVM system requirements shall be applied to suppliers with development contracts projected to exceed \$50M, in accordance with the NASA Federal Acquisition Regulation (FAR) Supplement, and to in-house work elements projected to exceed \$150M LCC.
2.2.8.2	For projects requiring EVM, Mission	For projects requiring EVM, Mission	No change.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
	Directorates shall conduct a pre-approval integrated baseline review as part of their preparations for KDP C to ensure that the project's work is properly linked with its cost, schedule, and risk and that the management processes are in place to conduct project-level EVM.	Directorates shall conduct a pre-approval integrated baseline review as part of their preparations for KDP C to ensure that the project's work is properly linked with its cost, schedule, and risk and that the management processes are in place to conduct project-level EVM.	
2.2.10	Each program and project shall complete and maintain a Compliance Matrix (see Appendix C) for this NPR and attach it to the Formulation Agreement for projects in Formulation and/or the Program or Project Plan. The program or project will use the Compliance Matrix to demonstrate how it is complying with the requirements of this document and verify the compliance of other responsible parties.	Each program and project shall complete and maintain a Compliance Matrix (see Appendix C) for this NPR and attach it to the Formulation Agreement for projects in Formulation and/or the Program or Project Plan. The program or project will use the Compliance Matrix to demonstrate how it is complying with the requirements of this document and verify the compliance of other responsible parties. (No change for small CAT 3)	No change
2.3.1	Each program and project shall have a Decision Authority who is the Agency's responsible individual who determines whether and how the program or project proceeds through the life cycle and the key program or project cost, schedule, and content parameters that govern the remaining life-cycle	Each program and project shall have a Decision Authority who is the Agency's responsible individual who determines whether and how the program or project proceeds through the life cycle and the key program or project cost, schedule, and content parameters that govern the remaining life-cycle	No change.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
	activities.	activities.	
2.3.1.1	The NASA AA shall approve all Agency Baseline Commitments (ABCs) for programs requiring an ABC and projects with a life-cycle cost greater than \$250 million.	The NASA AA shall approve all Agency Baseline Commitments (ABCs) for programs requiring an ABC and projects with a life-cycle cost greater than \$250 million. (For small CAT 3 projects the DA shall approve the project baseline)	All projects develop an ABC, only those at \$250M and above are approved by NASA AA and reported externally. As such, this is N/A for a small CAT 3 and the DA will approve the internal ABC for a small CAT 3 at KDP-C.
2.3.2	Each program and project shall have a governing PMC.	Each program and project shall have a governing PMC.	No change.
2.3.3	The Center Director (or designee) shall oversee programs and projects usually through the CMC, which monitors and evaluates all program and project work (regardless of category) executed at that Center.	The Center Director (or designee) shall oversee programs and projects usually through the CMC, which monitors and evaluates all program and project work (regardless of category) executed at that Center.	No change.
2.3.4	Following each LCR, the independent SRB and the program or project shall brief the applicable management councils on the results of the LCR to support the councils' assessments.	Following each LCR, the independent SRB (for small CAT 3 projects substitute an independent team, SRB not required) and the program or project shall brief the applicable management councils on the results of the LCR to support the councils' assessments.	For small CAT 3, independent review team used in place of an SRB.
2.4.1	After reviewing the supporting material and completing discussions with concerned parties, the Decision Authority determines whether and	After reviewing the supporting material and completing discussions with concerned parties, the Decision Authority determines whether and	No change.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
	how the program or project proceeds into the next phase and approves any additional actions. These decisions shall be summarized and recorded in the Decision Memorandum signed at the conclusion of the governing PMC by all parties with supporting responsibilities, accepting their respective roles.	how the program or project proceeds into the next phase and approves any additional actions. These decisions shall be summarized and recorded in the Decision Memorandum signed at the conclusion of the governing PMC by all parties with supporting responsibilities, accepting their respective roles.	
2.4.1.1	The Decision Memorandum shall describe the constraints and parameters within which the Agency, the program manager, and the project manager will operate; the extent to which changes in plans may be made without additional approval; any additional actions that came out of the KDP; and the supporting data (i.e., the cost and schedule datasheet) that provide further details.	The Decision Memorandum shall describe the constraints and parameters within which the Agency, the program manager, and the project manager will operate; the extent to which changes in plans may be made without additional approval; any additional actions that came out of the KDP; and the supporting data (i.e., the cost and schedule datasheet) that provide further details.	No change.
2.4.1.2	A divergence from the Management Agreement that any party identifies as significant shall be accompanied by an amendment to the Decision Memorandum.	A divergence from the Management Agreement that any party identifies as significant shall be accompanied by an amendment to the Decision Memorandum.	No change
2.4.1.3	During Formulation, the Decision Memorandum shall establish a target life-cycle cost range (and schedule range, if applicable) as well as the Management Agreement addressing	During Formulation, the Decision Memorandum shall establish a target life-cycle cost range (and schedule range, if applicable) as well as the Management Agreement addressing	No change.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
	the schedule and resources required to complete Formulation.	the schedule and resources required to complete Formulation.	
2.4.1.5	All projects and single-project programs shall document the Agency's life-cycle cost estimate and other parameters in the Decision Memorandum for Implementation (KDP C), and this becomes the ABC.	All projects and single-project programs shall document the Agency's life-cycle cost estimate and other parameters in the Decision Memorandum for Implementation (KDP C), and this becomes the ABC.	No change.
2.4.1.6	Tightly coupled programs shall document their life-cycle cost estimate, in accordance with the life-cycle scope defined in the FAD or PCA, and other parameters in their Decision Memorandum and ABC at KDP I.	Tightly coupled programs shall document their life-cycle cost estimate, in accordance with the life-cycle scope defined in the FAD or PCA, and other parameters in their Decision Memorandum and ABC at KDP I.	No change.
2.4.1.7	Programs or projects shall be rebaselined when: (1) the estimated development cost exceeds the ABC development cost by 30 percent or more (for projects over \$250 million, also that Congress has reauthorized the project); (2) the NASA AA judges that events external to the Agency make a rebaseline appropriate; or (3) the NASA AA judges that the program or project scope defined in the ABC has been changed or the tightly coupled program or project has been interrupted.	Programs or projects shall be rebaselined when: (1) the estimated development cost exceeds the ABC development cost by 30 percent or more (for projects over \$250 million, also that Congress has reauthorized the project); (2) the NASA AA judges that events external to the Agency make a rebaseline appropriate; or (3) the NASA AA judges that the program or project scope defined in the ABC has been changed or the tightly coupled program or project has been interrupted.	No change.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
2.4.2	All programs and projects develop cost estimates and planned schedules for the work to be performed in the current and following life-cycle phases (see Appendix I tables). As part of developing these estimates, the program or project shall document the basis of estimate (BOE) in retrievable program or project records.	All programs and projects develop cost estimates and planned schedules for the work to be performed in the current and following life-cycle phases (see Appendix I tables). As part of developing these estimates, the program or project shall document the basis of estimate (BOE) in retrievable program or project records.	No change.
2.4.3	Tightly coupled and single-project programs (regardless of life-cycle cost) and projects (with an estimated life-cycle cost greater than \$250 million) shall develop probabilistic analyses of cost and schedule estimates to obtain a quantitative measure of the likelihood that the estimate will be met in accordance with the following requirements.	Tightly coupled and single-project programs (regardless of life-cycle cost) and projects (with an estimated life-cycle cost greater than \$250 million) shall develop probabilistic analyses of cost and schedule estimates to obtain a quantitative measure of the likelihood that the estimate will be met in accordance with the following requirements.	No change.
2.4.3.1	Tightly coupled and single-project programs (regardless of life-cycle cost) and projects (with an estimated life-cycle cost greater than \$250 million) shall provide a range of cost and a range for schedule at KDP 0/KDP B, each range (with confidence levels identified for the low and high values of the range) established by a probabilistic analysis and based on	Tightly coupled and single-project programs (regardless of life-cycle cost) and projects (with an estimated life-cycle cost greater than \$250 million) shall provide a range of cost and a range for schedule at KDP 0/KDP B, each range (with confidence levels identified for the low and high values of the range) established by a probabilistic analysis and based on	No change.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term “small CAT 3” refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
	identified resources and associated uncertainties by fiscal year.	identified resources and associated uncertainties by fiscal year.	
2.4.3.2	At KDP I/KDP C, tightly coupled and single-project programs (regardless of life-cycle cost) and projects (with an estimated life-cycle cost greater than \$250 million) shall develop a resource-loaded schedule and perform a risk-informed probabilistic analysis that produces a JCL.	At KDP I/KDP C, tightly coupled and single-project programs (regardless of life-cycle cost) and projects (with an estimated life-cycle cost greater than \$250 million) shall develop a resource-loaded schedule and perform a risk-informed probabilistic analysis that produces a JCL.	N/A small CAT 3. No change.
2.4.4	Mission Directorates shall plan and budget tightly coupled and single-project programs (regardless of life-cycle cost) and projects (with an estimated life-cycle cost greater than \$250 million) based on a 70 percent joint cost and schedule confidence level or as approved by the Decision Authority.	Mission Directorates shall plan and budget tightly coupled and single-project programs (regardless of life-cycle cost) and projects (with an estimated life-cycle cost greater than \$250 million) based on a 70 percent joint cost and schedule confidence level or as approved by the Decision Authority.	N/A small CAT 3. No change.
2.4.4.1	Any JCL approved by the Decision Authority at less than 70 percent shall be justified and documented.	Any JCL approved by the Decision Authority at less than 70 percent shall be justified and documented.	N/A small CAT 3. No change.
2.4.4.2	Mission Directorates shall ensure funding for these projects is consistent with the Management Agreement and in no case less than the equivalent of a 50 percent JCL.	Mission Directorates shall ensure funding for these projects is consistent with the Management Agreement and in no case less than the equivalent of a 50 percent JCL.	For small CAT 3 consistent with the Management Agreement. No change.
3.3.1	Programs and projects shall follow the Technical Authority process	Programs and projects shall follow the Technical Authority process	No change.

Proposed Small Class D / CAT 3 (< \$150M LCC) NPR 7120.5 Guidance

In guidance matrix, term "small CAT 3" refers to a Class D/CAT 3 project with LCC < \$150M

Para #	NPR 7120.5 Requirement	Requirement w/small CAT 3	Implementation Guidance
	established in Section 3.3 of this NPR.	established in Section 3.3 of this NPR.	
3.4.1	Programs and projects shall follow the Dissenting Opinion process in this Section 3.4.	Programs and projects shall follow the Dissenting Opinion process in this Section 3.4.	No change.
3.5.1	Programs and projects shall follow the tailoring process in this Section 3.5.	Programs and projects shall follow the tailoring process in this Section 3.5.	No change.
3.5.5	A request for a permanent change to a prescribed requirement in an Agency or Center document that is applicable to all programs and projects shall be submitted as a "change request" to the office responsible for the requirements policy document unless formally delegated elsewhere.	A request for a permanent change to a prescribed requirement in an Agency or Center document that is applicable to all programs and projects shall be submitted as a "change request" to the office responsible for the requirements policy document unless formally delegated elsewhere.	No change.
3.6.1	A Center negotiating reimbursable space flight work with another agency shall propose NPR 7120.5 as the basis by which it will perform the space flight work.	A Center negotiating reimbursable space flight work with another agency shall propose NPR 7120.5 as the basis by which it will perform the space flight work.	NASA can accept equivalent to 7120.5 but the applicable requirements for this category would apply. The planned approach will be documented in the agreement. (For small CAT 3 - NASA will accept equivalent to 7120.5 (applicable and tailored to the project.)
3.7.1	Each program and project shall perform and document an assessment to determine an approach that maximizes the use of SI.	Each program and project shall perform and document an assessment to determine an approach that maximizes the use of SI.	No Change.



Earned Value Management (EVM) for Small Cat. 3 Projects

National Aeronautics and Space Administration

TABLE OF CONTENTS

	Page
Introduction	3
Principle 1 Plan all work scope of the program to completion	3
Principle 2 Break down the program work scope into finite pieces that are assigned to a responsible person or organization for control of technical, schedule and cost objectives	4
Principle 3 Integrate program work scope, schedule, and cost objectives into a performance measurement baseline plan against which accomplishments are measured. Control changes to the baseline	4
Principle 4 Use actual costs incurred and recorded in accomplishing the work performed	6
Principle 5 Objectively assess accomplishments at the work performance level	6
Principle 6 Analyze significant variances from the plan, forecast impacts, and prepare an estimate at completion based on performance to date and the remaining work to be performed	7
Principle 7 Use EVMS information in the organization's management processes	8
References	9

INTRODUCTION

NASA has prepared this Earned Value Management (EVM) for Small Cat. 3 Projects guidance for non-major acquisitions. These are defined as space flight and technology projects with a Life Cycle Cost (LCC) estimate of \$150 million or less. This approach was developed recognizing that smaller projects may not require the full rigor of an EVM System (EVMS) when compared with major acquisitions, such as much larger development projects. Note that this approach was developed for in-house work and that contracts that are part of these projects must meet the requirements of NFS 1834.201

The NASA EVM Capability has been scaled using the Seven Principles of an EVMS cited in the TechAmerica - formerly American National Standards Institute (ANSI) - Standard/Electronic Industry Association (EIA-748). When followed, these principles will provide necessary best practices and enable insight into performance for less complex projects. This approach allows flexibility in implementing EVM, while meeting the intent of the principles of project management. For more detail, go to the NASA EVM Capability System Description.

Each of the Seven Principles is discussed and examples of objective evidence (required products) have been identified that are necessary to achieve project requirements and meet the intent of the EVM principles. Although the Seven Principles offer less rigor in the implementation of an EVMS, it is necessary for NASA projects to demonstrate that fundamental management processes and products are in place for effective project management. As part of the Project Plan as described in NPR 7120.5E, the project will define the implementation of EVM in the Project Control Plan. See Appendix J-1 of the NASA EVM Implementation Handbook for assistance in developing a plan.

Principle 1

Plan all work scope for the program to completion

The Project Plan will be created and is a narrative description of the authorized project work scope and deliverables for in-house efforts as well as contracted efforts. As part of the planning effort, a Work Breakdown Structure (WBS) will be developed and used as the foundation for planning all authorized work required to complete the project. The WBS is a product-oriented hierarchical division of the hardware, software, services, and data required to produce the project's end product(s), structured according to the way the work will be performed and reflecting the way in which project costs and schedule, technical, and risk data are to be accumulated, summarized, and reported. For space flight projects, the Level 2 WBS found in *NASA Procedural Requirements (NPR) 7120.5* should be used, and tailored as necessary. For research and technology projects, the Level 2 WBS found in *NPR 7120.8* should be used. In addition, a WBS Dictionary should be developed which describes in detail, including deliverables, work effort in each WBS element. The NASA WBS Handbook (NASA SP/ NASA/SP-2010-3404, provides guidance on developing a WBS.

Objective Evidence:

- Project Plan, which includes the Project Control Plans where EVM is described

- WBS
- WBS Dictionary

Principle 2

Break down the program work scope into finite pieces that are assigned to a responsible person or organization for control of technical, schedule and cost objectives

The control accounts (CAs) and work packages (WPs), will be created to support the WBS and are the main juncture for the planning and control of authorized work. All aspects of the system including budgets, schedules, work assignments, cost collection, progress assessment, problem identification, and corrective actions come together at that point. Also, a project Acquisition Plan will be created and identify all major proposed acquisitions in relation to the project WBS.

The project will create and maintain an Integrated Master Schedule (IMS) to provide a time-phased plan for performing the project's approved total scope of work and for achieving the project's goals and objectives within a determined timeframe. The IMS will be a core tool for the integration, control, and analysis of all project work scope. The IMS will be structured based on the WBS, and CAs/WPs will be identified at meaningful levels to provide visibility into performance. Milestones and interdependencies will be developed using industry and NASA scheduling best practices (NASA/SP-2010-3403) to provide a logic network that accurately models the approved project scope. The IMS will provide the time-phasing utilized in the Performance Measurement Baseline (PMB).

Objective Evidence:

- Integrated Master Schedule (IMS)
- Make/Buy list
- Contracts with EVM flow down requirements
- Acquisition Plan

Principle 3

Integrate program work scope, schedule, and cost objectives into a performance measurement baseline against which accomplishments are measured. Control changes to the baseline.

Based on the WBS and CAs/WPs, the project will integrate project work scope, schedule, budget, and funding requirements into a PMB against which accomplishments can be measured. The objective is to create a comprehensive plan that links the project scope with the resources required in a time-phased manner, also known as Budgeted Cost for Work Scheduled (BCWS.). BCWS is established for each month of the plan, for as far out into the future as the work packages are defined. Ideally, this monthly plan would be established through the end of the project, but in reality there often are activities that are not defined well enough at the

KDP-C/confirmation gate review to enable projection through the end of development, let alone the end of the project. In those cases, quarterly or annual budgets for those undefined elements linked to a few measurable technical milestones will have to suffice until that point when the work is further defined, and a detailed BCWS can be created. Project management should work to minimize those undefined elements prior to or at KDP-C, and to define the detailed BCWS as early as feasible in the project, as the work packages that are not well defined carry a significant risk to completion of the project on time, within budget.

The project will provide a comprehensive Basis of Estimate (BoE) for all elements of the BCWS, down to at least the WP level.

While not included in the PMB, the establishment of reserves is a critical part of the project planning process. The Project's reserve posture and management plans, including Management Reserves held by either the Project or contractors, will be established via a rigorous and thorough process that identifies and characterizes all known risks to executing the plan, while also assessing the level of uncertainty in the Project's ability to execute the plan. The cost and schedule impacts of the risks and uncertainty will be assessed and documented in a comprehensive BoE for the recommended reserve posture. The plan for managing, allocating and tracking and reporting reserve usage at all levels of the Project (HQ/Program, Project, Contractor, CA, WP) will also be fully documented. The Project's reserves, BoE and management plan will be presented to Center and HQ management to enable management to make informed decisions regarding: (1) required funding and schedule reserve levels for the project above and beyond the PMB; and (2) where (contractor, control account, project top level, HQ) and when those reserves are to be held. Note that this planning and risk assessment process might take several iterations to enable the project to execute the final agreed project scope per an agreed schedule within the available budget.

PMB changes should, in principle, be limited to only approved changes in work scope or externally induced changes to schedules or budgets. It is recognized that additional changes might be desired, particularly if the project's performance varies so significantly from the baseline that a replanning effort is required. However, changes to the baseline based on anything other than scope or external changes – e.g., resets based on large variances to date – severely limit the PMB as a management tool, and are to be avoided if possible. All rebase-line or replans should be approved by the project sponsor at the HQ level. The purpose of the program control processes is to provide an accurate picture of progress against the plan agreed to at KDP-C/confirmation, and to facilitate management actions and decisions in response to that performance to date. The PMB must be stable in order to achieve that purpose.

Objective Evidence:

- Technical Baseline
- Schedule Baseline
- Budget Baseline
- Integrated PMB with monthly BCWS established for as many work packages as possible for as far into the future as possible
- Comprehensive Basis of Estimate (BOE) for the PMB as well as for the reserve posture
- Change Management Process
- Control Account Plan
- Risk Management Process and Assessment

- Funding/schedule reserve (MR) plan
- Schedule Management Plan

Principle 4

Use actual costs incurred and recorded in accomplishing the work performed

Actual costs recorded in the NASA accounting system will be obtained and used. It is essential that all costs be identified down to at least the CA level as work progresses and that the actual costs align to the authorized project budgets. All costs will be recorded in NASA's Core Financial Systems including SAP, Business Warehouse (BW), the Contract Management Module (CMM) and Agency Labor Distribution System (ALDS). Actual project costs should be used for month-end management reporting. The actual cost at contractors and within the NASA accounting system should include accruals in accordance with federal accounting standards, not just paid invoices. On occasion where actual cost is not recorded in the same time period as work accomplishment, alternate methods of reporting the actual cost needs to be implemented. A process of using estimated actuals will need to be considered to avoid artificial variances. Information on estimated actuals can be found in the *NASA/SP-2013-3704*, NASA EVM System Description.

Objective Evidence:

Note that the reports should provide data for the entire project down to at least the control account level.

- SAP Actual Cost Reports
- Contract Performance Report (CPR) or Integrated Program Management Report (IPMR) from both prime and subcontractors when applicable
- NF533 Reports

Principle 5

Objectively assess accomplishments at the work performance level

All work will be scheduled by WBS, and CAs/WPs, using measurable units or milestones to enable the objective assessment of accomplishments and to obtain earned value (also referred to as Budgeted Cost for Work Performed or BCWP).

The most appropriate Performance Management Technique (PMT) will be selected in order for EVM indicators to provide accurate and meaningful insight. The task types are Discrete, Level of Effort (LOE), and Apportioned. Projects should seek to plan as much work as possible as discrete tasks, using measurable completion units or milestones to enable accomplishments to be demonstrated objectively. Where a task truly has a direct, supporting relationship to a separate discrete task (e.g., Mission Assurance), that task should be planned as apportioned work. LOE should be limited to those activities (e.g., project management) that absolutely cannot be planned as, or linked to, a measurable completion unit or milestone.

Special attention should be paid to PMTs for discrete tasks that are relatively long in duration (>3 months). The number of such tasks should be minimized (by breaking them into measurable sub-tasks) where possible. Where longer duration tasks cannot be avoided, the PMT should be selected to ensure that progress can be measured and recorded accurately so that the performance measurement metrics will provide an accurate picture of project status.

The one common characteristic for all PMTs for all task types is that EV is ultimately determined by the product of percent of accomplishment and the Budgeted Cost for Work Scheduled (BCWS). Once a PMT is selected, it will be documented and reviewed by management and during the Integrated Baseline Review (IBR) to ensure that the above guidance has been followed.

Objective Evidence:

- Integrated Master Schedule (master, intermediate, detailed, as applicable)
- Budget Baseline with PMTs defined

Principle 6

Analyze significant variances from the plan, forecast impacts, and prepare an estimate at completion based on performance to date and the remaining work to be performed

The project will analyze significant variances to the plan to ensure that both cost and schedule performance is analyzed and reported. The project will, at a minimum, calculate the following EVM metrics for both monthly and cumulative data at the control account (CA) level:

- Cost Variance (CV),
- Cost Performance Index (CPI),
- Schedule Variance (SV),
- Schedule performance Index (SPI),
- To-Complete Performance Index (TCPI)
- Estimate at Complete (EAC)

Projects are encouraged to go beyond this minimum set of metrics, to track trends using 3-month, 6-month, 1-year, etc., CPIs and SPIs, because important trends are often hidden within the cumulative metrics and distorted in the monthly indices. Projects will include EVM metrics in monthly management reviews and discuss cause, impact, and corrective actions for cost and schedule performance that breaches established thresholds.

The project will prepare and maintain an Estimate at Complete (EAC) based on performance to date, actuals to date, and the estimate of the cost of the work remaining to be performed. The project will calculate an EAC monthly, update the official EAC at least annually. An EAC should also be updated when it is significantly different from the previously reported EAC.

Objective Evidence:

- Estimate at Complete (EAC)
- Contract Performance Report
- Cost Variance (CV) with explanations for all variances exceeding thresholds
- Schedule Variance (SV) with explanations for all variances exceeding thresholds
- Cost Performance Index (CPI)
- Schedule Performance Index (SPI)
- To-Complete Performance Index (TCPI)

Principle 7

Use the EVMS information in the organization's management processes

The project will use the EV in conjunction with other program control data at all management levels: Mission Directorate, program, project, system, subsystem, etc. in its decision-making process to gain an understanding of the performance to date and where the project is likely headed in the future based on trending data.

Objective Evidence:

- Monthly EVM reports, and other monthly cost, technical, risk, and schedule reports
- Metrics included in the project's monthly management reviews
- Timely, accurate, and reliable EV data to facilitate effective management decisions.
- Up to date EAC calculations

REFERENCES

- a. *TechAmerica Standard/Electronic Industries Alliance (ANSI/EIA)-748, Earned Value Management Systems* (latest version)
- b. *NASA Federal Acquisition Regulation Supplement (NFS) 1834.2, Earned Value Management System*
- c. *NASA Procedural Requirements (NPR) 7120.5E, NASA Space Flight Program and Project Management Requirements* (latest version)
- d. *NPR 7120.8, NASA Research and Technology Program and Project Management Requirements* (latest version),
- e. *NASA/SP-2012-599, Earned Value Management (EVM) Implementation Handbook*
- f. *NASA/SP-2013-3704, Earned Value Management (EVM) System Description*
- g. *NASA/SP-2010-3406, Integrated Baseline Review (IBR) Handbook*
- h. *NASA/SP-2010-3403, NASA Schedule Management Handbook*
- i. *NASA/SP-2010-3404, NASA Work Breakdown Structure (WBS) Handbook*
- j. NASA EVM website, <http://evm.nasa.gov>
- k. NASA Engineering Network (NEN) EVM Community of Practice (CoP), <https://nen.nasa.gov/web/evm/documents>
- l. *NASA Reference Guide for Project-Control Account Managers, Draft*