Marshall Space Flight Center
Engineering, Science & Technical Services

JACOBS
ESTS Group

Task Order Plan (TOP)

Contract Number: *NNM05AB50C*
TO Title: *Solid Launch Systems and Analysis*
TO Number: *33-050101* **Revision:** *12*

Period of Performance: *10/2/2010* to 09*/30/2011*

MSFC Initiator: *Robert Taylor*

(b)(4) [redacted]

Emergency: *No*

Revision 12:
The purpose of this revision is to extend this task into Contract Year 6 of the NNM05AB50C ESTS contract. This revision defines and estimates work for the period October 2, 2010 through September 30, 2011. Additionally, the Schedule, Performance Plan and Risk Assessment have been revised to reflect changes in task activities for the new period of performance." The overall combined total for this task is (b)(4) [redacted] Resource estimates are summarized as follows:

Subelement -01;	Closed with this revision. Work to continue on Subelement-SA.
Subelement -AB;	Total cost is (b)(4) [redacted] Estimated man hours are (b)(4) [redacted] with an associated cost of (b)(4) [redacted] Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 206518.
Subelement -CA;	Closed with revision 11.
Subelement -CB;	Closed with revision 9.
Subelement -SA;	Total cost is (b)(4) [redacted] Labor has (b)(4) [redacted] estimated man hours with an associated cost of (b)(4) [redacted] Other Direct Costs (ODC) of (b)(4) [redacted] was allocated for employee professional development and (b)(4) [redacted] was allocated for task related travel. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 520871.

Revision 11: This Task Order (TO) revision was created to address requested changes in scope for subelement -01 and -CA, and align schedules and resources with current expectations. Risk Assessment has not changed. This change results in an increase in estimated costs for -01, -AB, and administratively closes -CA. The " Total of Previous CY Revision" in the cost estimate of this Task Order revision was decreased by (b)(4) [redacted] from the previous TO revision as a result of administratively closing the Constellation/Ares support related subelement. This results in an overall "Change from the Previous CY Revision" of (b)(4) [redacted] Resource estimates are modified as follows:

Subelement -01;	Task estimates increased by (b)(4) [redacted] in order to fully cover the scope of

support work for additional RSRM systems engineering work in requirements development and igniter design and performance analysis. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 520871.08.01.01.02.

Subelement -AB; Task estimates decreased by (b)(4) The decrease is a result of elimination of (b)(4) labor hours in FY11. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 206518.08.01.20.

Subelement -CA; This task was administratively closed July 3, 2010 by this revision. Funding for this task was provided per MSFC WBS 136905.08.01.11.

Subelement -CB; Task closed with Rev 9.

Revision 10: This Task Order (TO) revision was created to address requested changes in scope for subelement -CA and align schedules and resources with current expectations. The Performance Plan and Risk Assessment has not changed. This change results no increase in funding. Resource estimates are modified as follows:

Subelement -01; Total cost is (b)(4) No changes to this subelement. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 520871.08.01.01.02.

Subelement -AB; Total cost is (b)(4) No changes made to this subelement. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 206518.08.01.20.

Subelement -CA; Total cost is (b)(4) Additional scope is added to hire a Subject Matter Expert to assist in the redesign of the Ares I exit cone to support Development Motor (DM)-3 test schedule. The subcontractor is being hired on a (b)(4) hour consulting basis at a cost of (b)(4) to address this increased scope of work. Funding for scope change is covered by transfer of funds from an under-run subject matter expert also within subelement -CA. The under-run subject matter expert's hours are lower than anticipated due to the decision not to address Ares I-X flight anomalies and from the sharing of resources with Ares Project Office sub-contract, which contains redundant scope. Funding for this task is provided per MSFC WBS 136905.08.01.11.

Subelement -CB; Total cost is (b)(4) Closed with Rev 9.

Revision 09: This Task Order (TO) revision was created to address requested changes in scope for subelements -01, -CA and –CB and align schedules and resources with current expectations. The Performance Plan has been updated to reflect current Technical and Schedule Objectives. Risk Assessment has not changed. This change results in a total increase of (b)(4) Resource estimates are modified as follows:

Subelement -01; Total cost is (b)(4) Labor increased by (b)(4) travel increased by (b)(4) and subcontract increased by (b)(4) in order to fully cover the scope of support work requested by the Program Office for FY10 in which RSRM plans an increase to six launches this year and provide additional support for postflights. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 520871.08.01.01.02.

Subelement -AB; Total cost is (b)(4) No changes made to this subelement. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 206518.08.01.20.

Subelement -CA; Total cost is (b)(4) Labor decreased by (b)(4) due to increase of scope for Subelement -01 and consolidation of remaining scope of work for Subelement –CB. Increased subcontract and travel by (b)(4) and (b)(4) respectively due to consolidation of Subelement -CB. Funding for this task is provided per MSFC WBS 136905.08.01.11.

Subelement -CB; Total cost is (b)(4) Labor decreased by (b)(4) travel decreased by (b)(4) and subcontract decreased by (b)(4) given the consolidation of Subelement –CB into Subelement -CA. Revision 09 closes Subelement –CB.

Revision 08: The purpose of this revision is to extend this task into Contract Year (CY) 5 of the NNM05AB50C ESTS contract. This revision defines and estimates work for the period October 3, 2009 through October 14, 2010. Cost estimation for CY5 includes an additional month than in previous contract years due to processing of payments received at end of five year contract. Additionally, the Schedule, Performance Plan and Risk Assessment have been revised to reflect changes in task activities for the new period of performance. The overall combined total for this task is (b)(4) Resource estimates are summarized as follows:

Subelement -01; Total cost is (b)(4) Labor has (b)(4) estimated man hours with an associated cost of (b)(4) Labor estimate is based on actual labor from CY04 and includes promotions for three employees. Other Direct Costs (ODC) of (b)(4) was allocated for employee professional development and (b)(4) was allocated for task related travel. Subcontract cost is (b)(4) based on actual cost from CY4 and includes (b)(4 increase in labor rates. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 520871.08.01.01.02.

Subelement -AB; Total cost is (b)(4) Estimated man hours are (b)(4) with an associated cost of (b)(4) Labor estimate is based on actual labor from CY04 and includes promotions for one employee. ODC of (b)(4) was allocated for employee professional development and (b)(4) was allocated for task related travel. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 206518.08.01.20.

Subelement -CA; Total cost is (b)(4). Labor has (b)(4) estimated man hours with an associated cost of (b)(4) Labor estimate is based on actual labor from CY04 and includes promotions for three employees. Other Direct Costs (ODC) of (b)(4) was allocated for employee professional development and recruitment, and (b)(4) was allocated for task related travel. Subcontract cost is (b)(4) based on actual cost from CY4 and includes (b)(4 increase in labor rates. Funding for this task is provided per MSFC WBS 136905.08.01.11.

Subelement -CB; Total cost is (b)(4) Labor has (b)(4) estimated man hours with an associated cost of (b)(4) Labor estimate is based on actual labor from CY04 and estimates competition of Subelement-CB at mid-year. Task related travel was estimated to be (b)(4) Subcontract cost is (b)(4) and includes (b)(4 increase in labor rates. Funding for this task is provided per MSFC WBS 136905.08.01.11.

Revision 07: This TO revision was created to align scope, schedule and resources with current expectations, and to cover replacement of a transferred employee. This revision also accounts for technical support provided to all Subelements, current Labor grades, increased funding to support Subelements –CB and -CA, and decreased funding to Subelements -01 and -AB. The Performance Plan and Risk Assessment have not changed. This change results in a total increase of (b)(4) In particular, resource estimates are modified as follows:

Subelement -01; Total cost is (b)(4) Decreased Labor by (b)(4) hours with a corresponding decrease in cost of (b)(4) to reallocate resources to Subelements –CA and -CB. Decreased Travel by (b)(4) based on revised support requirements. Increased Subcontract funding by (b)(4) to accommodate review activities. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 520871.08.01.01.02.

Subelement -AA; Revision 3 closes Subelement -AA.

Subelement -AB; Total cost is (b)(4) Decreased Labor by (b)(4) hours with a corresponding decrease in cost of (b)(4) to reallocate resources to Subelements –CA and -CB. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 206518.02.10.

Subelement -CA; Total cost is (b)(4) Increased Labor by (b)(4) hours with a corresponding increase in cost of (b)(4) Decreased Subcontract by (b)(4) o account for changes in travel estimates. Funding for this task is provided per MSFC WBS 136905.08.01.04.

Subelement -CB; Total cost is (b)(4) Increased Labor by (b)(4) hours with a corresponding increase in cost of (b)(4) to cover increased review and support activities. Decreased Other Direct by (b)(4) and decreased Subcontract by (b)(4) for costs shifting to CY5. Funding for this task is provided per MSFC WBS 136905.08.01.11.

This results in a total net increase in Labor by (b)(4) hours. Decreases Subelement -01 in labor and travel are associated with reduced plans for post-flight support in this contract year. Labor resources were reallocated to Subelement -CA from Subelements -01 and -AB to support Ares I Performance Specification Reviews, Design Verification Reviews, Static Test Plan Reviews, Post-Fire Engineering Evaluation Plan Reviews, and support activities. Labor resources were also reallocated to Subelement -CB from Subelement -01 to support Ares I-X Verification Requirement Definition Reviews, Heritage Hardware Verification Reviews, First Stage Launch Readiness Analysis Reviews, Structural Analyses, and support activities. Total overall labor hours increased due to new efforts to set up a bench scale flow study laboratory, solid rocket motor design training, quick turnaround time for reviews and requirements resolutions, and increased estimation accuracy for end-of-contract year available hours. Net decreases were also seen in Travel, Subcontracts, and Other Direct Charges. This revision is effective August 7, 2009.

Revision 06: This Task Order (TO) revision was created to align scope, schedule and resources with current expectations. This revision also accounts for technical support provided to Subelement -CA, current Labor grades, and increased funding to support Subelements -01 and -AB. The Performance Plan and Risk Assessment have not been revised. This change results in a total increase of (b)(4) In particular, resources estimates are modified as follows:

Subelement -01; Total cost is (b)(4) Increased Labor by (b)(4) hours with a corresponding increase in cost of (b)(4) Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 520871.08.01.01.02.

Subelement -AA; Revision 03 closes Subelement -AA.

Subelement -AB; Total cost is (b)(4) Increased Labor by (b)(4) hours with a corresponding increase in cost of (b)(4) Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 206518.02.10.

Subelement -CA; Total cost is (b)(4) Decreased Labor by (b)(4) hours with a corresponding decrease in cost of (b)(4) Decreased Subcontract by (b)(4) to reallocate resources to Subelement -CB. Funding for this task is provided per MSFC WBS 136905.08.01.04.

Subelement -CB; Total cost is (b)(4) Corrected estimated Labor grades and increased Labor by (b)(4) hours with a corresponding increase in cost of (b)(4) Increased Subcontract by (b)(4) to account for resources reallocated from Subelement -CA. Increased travel by (b)(4) to correct for estimated travel. Funding for this task is provided per MSFC WBS 136905.08.01.11.

This results in a total net increase in Labor by (b)(4) hours. Labor increased for Subelement -01 to support Space Shuttle Program anomaly investigations. Labor increased for Subelement -AB in response to additional funding provided by the customer to support this subelement

throughout the remainder of the fiscal year. Labor and Subcontract resources were reallocated to Subelement -CB from Subelement -CA to support Ares I-X Hardware Acceptance Reviews and support activities. Decreased Labor for Subelement -CA was offset to some extent by the addition of technician support. This revision is effective June 5, 2009.

Revision 05: This Task Order (TO) revision created to add one full time employee to support Subelements -CA and -CB, remove one full time employee from Subelement -CB, and replenish support to Subelement -CB by reallocating resources from Subelements -01 and -CA. This revision also aligns scope, schedule and resources with current expectations. The Performance Plan and Risk Assessment have not been revised. This change results in a total increase of (b)(4) In particular resources estimates are modified as follows:

Subelement -01; Total cost is (b)(4) Decrease Labor by (b)(4) hours with a corresponding decrease in cost of (b)(4) Increased Subcontract by (b)(4) to correct for estimated rates. This results in a total decrease of Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 520871.08.01.01.02.

Subelement -AA; Revision 03 closes Subelement -AA.

Subelement -AB; Total cost is (b)(4) based on (b)(4) estimated man hours for Labor. No changes were required in Revision 05. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 206518.02.10.

Subelement -CA; Total cost is (b)(4) Increased Labor by (b)(4) hours with a corresponding increase in cost of (b)(4) Funding for this task is provided per MSFC WBS 136905.08.01.04.

Subelement -CB; Total cost is (b)(4) Increased Labor by (b)(4) hours with a corresponding increase in cost of (b)(4) Funding for this task is provided per MSFC WBS 136905.08.01.11. MSFC WBS 136905.08.01.09 was removed in Revision 05 at the request of the customer and Task Order 33-050101 will, therefore, not be funded per this WBS.

This results in a total net increase in Labor by (b)(4) hours. Labor was recently reallocated to Subelement -01 from Subelement -CA to support Space Shuttle Program anomaly investigations. However, Labor resources were subsequently reallocated from Subelements -01 and -CA to replenish support for Subelement -CB, due to the loss of one full time employee. Furthermore, one new full time employee was added to support Subelements -CA and -CB. Therefore, there is a net decrease in Labor costs for Subelement -01 and a net increase in Labor costs for Subelements -CA and -CB. The net increase for Subelement -CB can also be attributed to the current and projected increase in Ares I-X support activities. This revision is effective February 5, 2009.

Revision 04: This Task Order (TO) revision created Subelement -AB to provide support for the Ares V program. This revision also aligns scope, schedule and resources with current expectations. The Performance Plan and Risk Assessment have not been revised. This change results in a total decrease of (b)(4) which falls within current funding levels. No additional budget is required for previously existing subelements. Additional funding was provided specifically for work to be performed on Subelement -AB. In particular resources estimates are modified as follows:

Subelement -01; Total cost is (b)(4) Reduced Labor by (b)(4) hours with a corresponding reduction in cost of (b)(4) which falls within current funding levels. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 520871.08.01.01.02.

Subelement -AA; Revision 03 closes Subelement -AA.

Subelement -AB; Total cost is (b)(4) based on (b)(4) stimated man hours for Labor, which falls within funding levels. Funding for this task is provided per MSFC

Work Breakdown Structure (WBS) 206518.02.10.

Subelement -CA; Total cost is (b)(4) Reduced Labor by (b)(4) hours with a corresponding reduction in cost of (b)(4) which falls within current funding levels. Funding for this task is provided per MSFC WBS 136905.08.01.04.

Subelement -CB; Total cost is (b)(4) Reduced Labor by (b)(4) hours with a corresponding reduction in cost of (b)(4) which falls within current funding levels. Funding for this task is provided per MSFC WBS 136905.08.01.11 and 136905.08.01.09.

This results in a total net reduction in Labor by (b)(4) hours. The decrease in Labor costs for Subelement -01, -CA, and -CB is due to the reallocation of resources for the new Subelement -AB. The Total decrease in Labor costs is due to the loss of one full time employee, which is planned to be replaced in January. This revision is effective November 25, 2008.

Revision 03: This TO revision established this task for Contract Year (CY) 4 of the NNM05AB50C ESTS contract. It is a continuation of the effort previously performed under TO 33-050101-00 from CY3. Revision 03 closed Subelement -AA. This task defines and estimates for the period 27 September 2008 through 25 September 2009. The Schedule, Performance Plan, and Risk Assessment reflect the estimates for task activities for the new period of performance. The overall combined total for this task is (b)(4) Resource estimates are summarized as follows:

Subelement -01; Total cost is (b)(4) Labor has (b)(4) estimated man hours with an associated cost of (b)(4) Labor estimate is based on actual labor from CY3. Training cost of (b)(4) was allocated for employee professional development and (b)(4) was allocated for task related travel based on CY3 actuals. Subcontract cost is (b)(4) based on actual cost from CY3. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 520871.08.01.01.02.

Subelement -AA; Revision 03 closes Subelement -AA.

Subelement -CA; Total cost is (b)(4) Labor has (b)(4) estimated man hours with an associated cost of (b)(4) Labor estimate is based on actual labor from CY3. Training cost of (b)(4) was allocated for employee professional development and was allocated for task related travel based on CY3 actuals. Subcontract cost is (b)(4) based on actual cost from CY3 and projected labor increase for CY4. Funding for this task is provided per MSFC WBS 136905.08.01.11.

Subelement -CB; Total cost is (b)(4) Labor has (b)(4) estimated man hours with an associated cost of (b)(4) Labor estimate is based on actual labor from CY3. Training cost of (b)(4) was allocated for employee professional development and was allocated for task related travel based on CY3 actuals. Funding for this task is provided per MSFC WBS 136905.08.01.11 and 136905.08.01.09.

Revision 02: This revision aligns scope, schedule and resources with current expectations. The Performance Plan and Risk Assessment have not been revised. This change results in a total increase of (b)(4) which falls within current funding levels. No additional budget is required. In particular resources estimates are modified as follows:

Subelement -01; Reduced Labor by (b)(4) hours with a corresponding reduction in cost of (b)(4) increased Other by (b)(4) increased Subcontract by (b)(4) and reduced Travel by (b)(4) This results in an increase of (b)(4) which falls within current funding levels. Funding for this task is provided per MSFC Work Breakdown Structure (WBS) 520871.08.01.01.02.

Subelement -AA; Reduced Labor by (b)(4) hours with a corresponding reduction in cost of

(b)(4) increased Other by (b)(4) and reduced Subcontract by (b)(4) This results in a reduction of (b)(4) Funding for this task is provided per MSFC WBS 136905.08.01.11.

Subelement -CA; Reduced Labor by (b)(4) hours with a corresponding reduction in cost of (b)(4) increased Other by (b)(4) increased Subcontract by (b)(4) and increased Travel by (b)(4) This results in an increase of (b)(4) which falls within current funding levels. Funding for this task is provided per MSFC WBS 136905.08.01.04.

Subelement -CB; Increased Labor by (b)(4) hours with a corresponding increase in cost of (b)(4) increased Other by (b)(4) reduced Subcontract by (b)(4) and increased Travel by (b)(4) This results in a total reduction of (b)(4) Funding for this task is provided per MSFC WBS 136905.08.01.11 and 136905.08.01.09.

This results in a total net reduction in Labor by (b)(4) hours, increase in Other by (b)(4) increase in Subcontract by (b)(4) and reduction in Travel by (b)(4) The total reduced Labor is due to delayed hiring of additional resources and internal employee transfers. The result was a total increase in Subcontract costs, particularly in Subelement -CA, since the use of more Subcontract labor than originally anticipated was required. The increase in Subcontract costs for Subelement -CA is also due to resources being reallocated from Subelement -AA. The increased Labor for Subelement -CB is due to the hiring of a new employee dedicated to support design and development of the Ares I-X vehicle within the existing scope of this task order. Total reduction in Travel is due to funding being cut for all Ares V tasks and schedule delays for Shuttle launches. Increase in Travel for Subelement -CB is due to support of Ares I-X Integrated Process and Product Development reviews at Kennedy Space Center. Increase in Other is the result of higher recruiting, relocation, and referral bonus costs due to increased head count and difficulty finding qualified candidates locally with Kennedy Space Center operations and RSRM hardware and systems experience. This revision is effective July 31, 2008.

Revision 01: This revision aligns scope, schedule and resources with current expectations. In particular resources estimates are modified as follows:

Subelement -01; Reduced Labor by (b)(4) hours, reduced Other by (b)(4) and increased Subcontract by (b)(4)

Subelement -AA; Increased Labor by (b)(4) hours, reduced Other by (b)(4) decreased Subcontract by (b)(4) increased Travel by (b)(4)

Subelement -CA; Increased Labor by (b)(4) hours, increased Other by (b)(4) and increased Subcontract by (b)(4)

Subelement -CB; Increased Labor by (b)(4) hours, reduced Other by (b)(4) and reduced Subcontract by (b)(4)

This results in a total net increase in Labor by (b)(4) hours, Other by (b)(4) Subcontract by (b)(4) and Travel by (b)(4) The reduced Labor for Subelement -01 is due to delayed hiring of additional resources coupled with launch delays. The additional labor hours for the other Subelements are due to the hiring of new employees to support design and development of the Ares vehicles within the existing scope of this task order. Increase in Travel is in response to unanticipated trips required to support Ares V trade studies. Increase in Other is the result of higher recruiting and relocation costs due to increased head count and difficulty finding qualified candidates locally with Kennedy Space Center operations and RSRM hardware and systems experience. Increase in Subcontract costs is due to directed reallocation of subcontract labor associated with Booster Deceleration Motor move to First Stage from Upper Stage. This revision is effective February 12, 2008. Funding for this task is provided per MSFC Purchase Requisitions (PRs) 4200147218, 4200159805, 4200138875, 4200162168, 4200157055, and 4200159805.

Revision 00: This Task Order (TO) established this task in Contract Year (CY) 3 of the NNM05AB50C ESTS contract. It is a continuation of the effort previously performed under TO 33-020203-02 from CY 02. The reason for the TO change is the growth of the solid propulsion organization from a branch to a division. This task defines and estimates work for the period 29 September 2007 through 26 September 2008. The Schedule, Performance Plan, and Risk Assessment reflect the estimates for task activities for the new period of performance.

1.0 Task Order Description & Objectives

1.1 Subelement -01, Reusable Solid Rocket Motor

1.1.1 Provide analytical and technical support for Reusable Solid Rocket Motor (RSRM) Project supported tests, trade studies, design analysis, Space Shuttle flights, and evaluation of Critical Math Models (CMMs). This support consists of performing independent ballistic and ignition transient analyses for tests, proposed and recommended design changes, and each Shuttle flight using existing, modified, and new modeling algorithms. Each performance element identified for requirement verification will be evaluated. Independent RSRM, RSRM igniter and performance related RSRM systems test and flight databases will be maintained or created. Support RSRM reviews and anomaly investigations.

1.1.2 Support development of upgrades to Solid Motor Branch tools suite. This includes development of Graphical User Interfaces (GUIs) for ballistics analysis codes. This will also include the evaluation, development, and validation of tools for the Ignition Transient Program and the Solid Propellant Performance Program, and GUIs for related analysis databases.

1.1.3 Provide support for RSRM launch and post-flight assessment.

1.1.4 Closely monitor design progress, anticipating potential issues and concerns, and coordinating with the applicable technical contacts to eliminate problems.

1.1.5 Perform other Solid Motor Branch related technical assessments and evaluations as specifically identified and coordinated between Task Lead and Task Initiator on a case-by-case basis.

1.2 Subelement -CA, Crew Launch Vehicle First Stage

1.2.1 Develop and maintain detailed working knowledge of the Crew Launch Vehicle (CLV) Five Segment Reusable Solid Rocket Motor (RSRMV) and Ares Test Flight Program systems designs through attendance of and participation in technical interchange and planning meetings. Provide engineering support required for development of vehicle design and the integration of the elements and components to meet the safety, technical, and program (cost & schedule) objectives of the overall systems. Support the evaluation of systems program risks and provide recommendations for risk mitigation.

1.2.2 Provide support to requirements definition and flow down. This includes providing support for reviewing necessary requirements and assuring these requirements are properly documented. Provide support for RSRMV and Ares Test Flight Program to overall vehicle systems integration, including the identification of issues where a push-back on requirements from Solid Motors to the vehicle system is needed. Incorporate lessons learned from previous projects to ensure the requirements meet the intended objectives of the program and that thought is given towards the method for eventual verification of the requirements. Support the development of detailed validation and verification plans.

1.2.3 Provide support for the evaluation of design features and any proposed design changes as they relate to Ares Test Flight Program, Solid Motors, and overall vehicle integration. Actively participate in reviews and support the resolution of all identified integration actions/issues generated during the review.

1.2.4 Support the development of system, element, and component level test plans, and their execution, including design, fabrication, testing, documentation, and analysis. Provide evaluation of the test plans to ensure all the intended verification objectives can be accomplished.

1.2.5 Initial focus will be on identification and resolution of RSRM and Ares Test Flight Program to CLV integration issues through reviews of requirements documents, verification and validation plans, design, analyses, and test plans that support system verification and validation, and design decisions.

1.2.6 Provide analytical and technical support for CLV RSRMV and Ares Test Flight Program trade studies, design analyses, tests, flights, and evaluation of CMMs. This support consists of performing independent ballistic and ignition transient analyses for design, tests, proposed and recommended design changes, and each flight using existing, modified, and new modeling algorithms. Each performance element identified for requirement verification will be evaluated. Independent test and flight databases will be created and maintained as appropriate.

1.2.7 Closely monitor design progress, anticipating potential issues and concerns, and coordinating with the applicable technical contacts to eliminate problems.

1.2.8 Support RSRMV and Ares Test Flight Program related testing, including assessments of test plans, test procedures, and test reports as they related to ballistic analyses. Identify and pursue resolution of issues.

1.2.9 Support RSRMV and Ares Test Flight Program reviews, anomaly investigations, and failure investigation teams. Identify and pursue resolution of issues.

1.3 Subelement -CB Ares I-X First Stage (This subelement was closed under Revision 09.)

1.3.1 Develop and maintain detailed working knowledge of the Ares I-X First Stage systems designs through attendance of and participation in technical interchange and planning meetings. Provide engineering support required for development of vehicle design and the integration of the elements and components to meet the safety, technical, and program (cost & schedule) objectives of the overall systems. Support the evaluation of systems program risks and provide recommendations for risk mitigation.

1.3.2 Provide support to requirements definition and flow down. This includes providing support for reviewing necessary requirements and assuring these requirements are properly documented. Provide support for Ares I-X first Stage to overall vehicle systems integration, including the identification of issues where a pushback on requirements from Solid Motors to the vehicle system is needed. Incorporate lessons learned from previous projects to ensure the requirements meet the intended objectives of the program and that thought is given towards the method for eventual verification of the requirements. Support the development of detailed validation and verification plans.

1.3.3 Provide support for the evaluation of design features and any proposed design changes as they relate to Ares I-X Solid Motors and overall vehicle integration. Actively participate in reviews and support the resolution of all identified integration actions/issues generated during the review.

1.3.4 Support the development of system, element, and component level test plans, and their execution. Provide evaluation of the test plans to ensure all the intended verification objectives can be accomplished.

1.3.5 Initial focus will be on identification and resolution of Ares I-X Solid Motors to CLV integration issues through reviews of requirements documents, verification and validation plans, design, analyses, and test plans that support system verification and validation, and design decisions.

1.3.6 Provide analytical and technical support for Ares I-X CLV RSRMV trade studies, design analyses, tests, flights, and evaluation of CMMs. This support consists of performing independent ballistic and ignition transient analyses for design, tests, proposed and recommended design changes, and each flight using existing, modified, and new modeling algorithms. Each performance element identified for requirement verification will be evaluated. Independent test and flight databases will be created and maintained as appropriate.

1.3.7 Closely monitor design progress, anticipating potential issues and concerns, and coordinating with the applicable technical contacts to eliminate problems.

1.3.8 Support Ares I-X RSRMV related testing, including assessments of test plans, test procedures, and test reports as they related to ballistic analyses. Identify and pursue resolution of issues.

1.3.9 Support Ares I-X RSRMV reviews, anomaly investigations, and failure investigation teams. Identify and pursue resolution of issues.

1.4 Subelement -AA, Ares-V Heavy Launch Vehicle First Stage (This subelement was closed under Revision 03.)

1.4.1 Develop and maintain detailed working knowledge of the Heavy Lift Cargo Launch Vehicle (CaLV) systems designs through attendance of and participation in technical interchange and planning meetings. Provide engineering support required for development of vehicle design and the integration of the elements and components to meet the safety, technical, and program (cost & schedule) objectives of the overall systems. Support the evaluation of systems program risks and provide recommendations for risk mitigation.

1.4.2 Provide support to requirements definition and flow down. This includes providing support for reviewing necessary requirements and assuring these requirements are properly documented. Provide support for CaLV solid motors to overall vehicle systems integration, including the identification of issues where a pushback on requirements from Solid Motors to the vehicle system is needed. Incorporate lessons learned from previous projects to ensure the requirements meet the intended objectives of the program and that thought is given towards the method for eventual verification of the requirements. Support the development of detailed validation and verification plans.

1.4.3 Provide support for the evaluation of design features and any proposed design changes as they relate to Solid Motors and overall CaLV vehicle integration. Actively participate in reviews and support the resolution of all identified integration actions/issues generated during the review.

1.4.4 Support the development of system, element, and component level test plans, and their execution. Provide evaluation of the test plans to ensure all the intended verification objectives can be accomplished.

1.4.5 Initial focus will be on identification and resolution of CaLV Solid Motor integration issues through reviews of requirements documents, verification and validation plans, design, analyses, and test plans that support system verification and validation, and design decisions.

1.4.6 Provide analytical and technical support for CaLV Solid Motor trade studies, design analyses, tests, flights, and evaluation of CMMs. This support consists of performing independent ballistic and ignition transient analyses for design, tests, proposed and recommended design changes, and each flight using existing, modified, and new modeling algorithms. Each performance element identified for requirement verification will be evaluated. Independent test and flight databases will be created and maintained as appropriate.

1.4.7 Closely monitor design progress, anticipating potential issues and concerns, and coordinating with the applicable technical contacts to eliminate problems.

1.4.8 Support CaLV Solid Motor related testing, including assessments of test plans, test procedures, and test reports as they related to ballistic analyses. Identify and pursue resolution of issues.

1.4.9 Support CaLV Solid Motor reviews, anomaly investigations, and failure investigation teams. Identify and pursue resolution of issues.

1.5 Subelement -AB, Heavy Lift Booster

1.5.1 Provide analytical and technical support for CaLV Solid Motor trade studies, design analyses, tests, and evaluation of CMMs. This support consists of performing independent ballistic and ignition transient analyses for design, proposed design changes, and tests using existing, modified, and new modeling algorithms. Each performance element identified for requirement verification will be evaluated. Test databases will be created and maintained as appropriate.

1.5.2 Support CaLV Solid Motor related testing, including assessments of test plans, test procedures, and test reports as they relate to ballistic analyses. Identify and pursue resolution of issues.

1.6 Subelement -SA, Reusable Solid Rocket Motor

1.6.1 Provide analytical and technical support for Reusable Solid Rocket Motor (RSRM) Project supported tests, trade studies, design analysis, Space Shuttle flights, and evaluation of Critical Math Models (CMMs). This support consists of performing independent ballistic and ignition transient analyses for tests, proposed and recommended design changes, and each Shuttle flight using existing, modified, and new modeling algorithms. Each performance element identified for requirement verification will be evaluated. Independent RSRM, RSRM igniter and performance

related RSRM systems test and flight databases will be maintained or created. Support RSRM reviews and anomaly investigations.

1.6.2 Support development of upgrades to Solid Motor Branch tools suite. This includes development of Graphical User Interfaces (GUIs) for ballistics analysis codes. This will also include the evaluation, development, and validation of tools for the Ignition Transient Program and the Solid Propellant Performance Program, and GUIs for related analysis databases.

1.6.3 Provide support for RSRM launch and post-flight assessment.

1.6.4 Closely monitor design progress, anticipating potential issues and concerns, and coordinating with the applicable technical contacts to eliminate problems.

1.6.5 Perform other Solid Motor Branch related technical assessments and evaluations as specifically identified and coordinated between Task Lead and Task Initiator on a case-by-case basis.

2.0 Technical Approach (Including required input, guidelines & assumptions)

Specific technical approaches for each support activity will be identified and coordinated on a case-by-case basis between the MSFC Task Initiator and ESTS Task Lead.

2.1 Subelement -01, Reusable Solid Rocket Motor

2.1.1 Performance Analysis

2.1.1.1 Collect inputs: Motor configuration, propellant characteristics, launches / test conditions, launch / test telemetry.

2.1.1.2 Modify ballistic performance modeling algorithms as appropriate.

2.1.1.3 Generate model input data files.

2.1.1.4 Perform internal ballistic performance analyses.

2.1.1.5 Compare results to requirements, historical experience, statistical analyses, and contractor results.

2.1.1.6 Update performance database.

2.1.1.7 Document and deliver results with recommendations.

2.1.2 Alternate Solid Propellant Analysis Tool

2.1.2.1 Coordinate/Identify customer requirements for replacement burn-back analysis tool.

2.1.2.2 Identify and evaluate potential off the shelf software and/or software development environment as necessary.

2.1.2.3 Modify/Develop models/macros/code as necessary.

2.1.2.4 Conduct verification testing.

2.1.2.5 Conduct design reviews and make necessary changes.

2.1.2.6 Document, deliver and place under configuration control.

2.1.3 GUI Development

2.1.3.1 Coordinate/Identify customer requirements for each analysis tool GUI/module

2.1.3.2 Develop prototype GUI code for each module and integrated GUI.

2.1.3.3 Conduct preliminary design reviews and make necessary changes.

2.1.3.4 Develop final GUI code for each module and integrated GUI.

2.1.3.5 Conduct verification testing of each module and integrated GUI.

2.1.3.6 Conduct design reviews and make necessary changes.

2.1.3.7 Document, deliver and place under configuration control.

2.1.4 Support RSRM related design reviews. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.1.5 Support RSRM related testing, including assessments of test plans, test procedures, and test reports. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.1.6 Support RSRM anomaly investigations and failure investigation teams. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.1.7 Document Ignition Transient Program and deliver report.

2.1.8 Develop and deliver a steady-state ballistic performance analysis Technical Memorandum.

2.1.9 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis.

2.1.10 Collect inputs: Motor configuration, propellant characteristics, launch / test conditions, launch / test telemetry.

2.1.11 Create and/or modify ballistic performance modeling algorithms as appropriate.

2.1.12 Generate model input data files.

2.1.13 Perform internal ballistic performance analyses.

2.1.14 Compare results to requirements, historical experience, statistical analyses, and contractor results.

2.1.15 Update performance database.

2.1.16 Document and deliver results with recommendations.

2.1.17 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis.

2.2 Subelement – CA, Crew Launch Vehicle First Stage

2.2.1 Includes Ares Test Flight Program.

2.2.2 Solid Rocket Systems Engineering and Integration

2.2.2.1 Attend TIMs and planning meetings. Complete assigned action items. Document and deliver results with recommendations.

2.2.2.2 Support relevant CLV requirements and design reviews. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.2.2.3 Support relevant testing, including design, fabrication, documentation, analysis and assessments of test plans, test procedures, and test reports. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.2.2.4 Support relevant anomaly investigations and failure investigation teams. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.2.2.5 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis.

2.2.3 Booster Systems Engineering and Integration

2.2.3.1 Attend TIMs and planning meetings. Complete assigned action items. Document and deliver results with recommendations.

2.2.3.2 Support relevant CLV requirements and design reviews. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.2.3.3 Support relevant trade studies and other assessments. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.2.3.4 Support relevant testing, including assessments of test plans, test procedures, and test reports. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.2.3.5 Support relevant anomaly investigations and failure investigation teams. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.2.3.6 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis.

2.2.4 Booster Performance Analysis

2.2.4.1 Collect inputs: Motor configurations, propellant characteristics, launch / test conditions, launch / test telemetry, etc.

2.2.4.2 Create and/or modify performance modeling algorithms as appropriate.

2.2.4.3 Generate model input data files.

2.2.4.4 Perform analyses.

2.2.4.5 Compare results to requirements, historical experience, statistical analyses, and results of other analyses.

2.2.4.6 Update database.

2.2.4.7 Document and deliver results with recommendations.

2.2.4.8 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis.

2.3 Subelement – CB, Ares I-X First Stage (This subelement was closed under Revision 09.)

2.3.1 Solid Rocket Systems Engineering and Integration

2.3.1.1 Attend TIMs and planning meetings. Complete assigned action items. Document and deliver results with recommendations.

2.3.1.2 Support relevant Ares I-X Solid Motor requirements and design reviews. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.3.1.3 Support relevant testing, including assessments of test plans, test procedures, and test reports. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.3.1.4 Support relevant anomaly investigations and failure investigation teams. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.3.1.5 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis.

2.3.2 Booster Systems Engineering and Integration

2.3.2.1 Attend TIMs and planning meetings. Complete assigned action items. Document and deliver results with recommendations.

2.3.2.2 Support relevant Ares I-X Solid Motor requirements and design reviews. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.3.2.3 Support relevant trade studies and other assessments. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.3.2.4 Support relevant testing, including assessments of test plans, test procedures, and test reports. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.3.2.5 Support relevant anomaly investigations and failure investigation teams. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.3.2.6 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis.

2.3.3 Booster Performance Analysis

2.3.3.1 Collect inputs: Motor configurations, propellant characteristics, launch / test conditions, launch / test telemetry, etc.

2.3.3.2 Create and/or modify performance modeling algorithms as appropriate.

2.3.3.3 Generate model input data files.

2.3.3.4 Perform analyses.

2.3.3.5 Compare results to requirements, historical experience, statistical analyses, and results of other analyses.

2.3.3.6 Update database.

2.3.3.7 Document and deliver results with recommendations.

2.3.3.8 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis.

2.4 Subelement – AA, Ares V Heavy Launch Vehicle First Stage (This subelement was closed under Revision 03.)

2.4.1 Solid Rocket Systems Engineering and Integration

2.4.1.1 Attend TIMs and planning meetings. Complete assigned action items. Document and deliver results with recommendations.

2.4.1.2 Support relevant CaLV Solid Motor requirements and design reviews. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.4.1.3 Support relevant testing, including assessments of test plans, test procedures, and test reports. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.4.1.4 Support relevant anomaly investigations and failure investigation teams. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.4.1.5 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis.

2.4.2 Booster Systems Engineering and Integration

2.4.2.1 Attend TIMs and planning meetings. Complete assigned action items. Document and deliver results with recommendations.

2.4.2.2 Support relevant CaLV Solid Motor requirements and design reviews. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.4.2.3 Support relevant trade studies and other assessments. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.4.2.4 Support relevant testing, including assessments of test plans, test procedures, and test reports. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.4.2.5 Support relevant anomaly investigations and failure investigation teams. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.4.2.6 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis.

2.4.3 Booster Performance Analysis

2.4.3.1 Collect inputs: Motor configurations, propellant characteristics, launch / test conditions, launch / test telemetry, etc.

2.4.3.2 Create and/or modify performance modeling algorithms as appropriate.

2.4.3.3 Generate model input data files.

2.4.3.4 Perform analyses.

2.4.3.5 Compare results to requirements, historical experience, statistical analyses, and results of other analyses.

2.4.3.6 Update database.

2.4.3.7 Document and deliver results with recommendations.

2.4.3.8 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis.

2.5 Subelement – AB, Heavy Lift Booster

2.5.1 Booster Performance Analysis

2.5.1.1 Collect inputs: Motor configurations, propellant characteristics, launch / test conditions, launch / test telemetry, etc.

2.5.1.2 Create and/or modify performance modeling algorithms as appropriate.

2.5.1.3 Generate model input data files.

2.5.1.4 Perform analyses.

2.5.1.5 Compare results to requirements, historical experience, statistical analyses, and results of other analyses.

2.5.1.6 Update database.

2.5.1.7 Document and deliver results with recommendations.

2.5.1.8 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis.

2.6 Subelement -SA, Reusable Solid Rocket Motor

2.6.1 Performance Analysis

2.6.1.1 Collect inputs: Motor configuration, propellant characteristics, launches / test conditions, launch / test telemetry.

2.6.1.2 Modify ballistic performance modeling algorithms as appropriate.

2.6.1.3 Generate model input data files.

2.6.1.4 Perform internal ballistic performance analyses.

2.6.1.5 Compare results to requirements, historical experience, statistical

analyses, and contractor results.

2.6.1.6 Update performance database.

2.6.1.7 Document and deliver results with recommendations.

2.6.2 Alternate Solid Propellant Analysis Tool

2.6.2.1 Coordinate/Identify customer requirements for replacement burn-back analysis tool.

2.6.2.2 Identify and evaluate potential off the shelf software and/or software development environment as necessary.

2.6.2.3 Modify/Develop models/macros/code as necessary.

2.6.2.4 Conduct verification testing.

2.6.2.5 Conduct design reviews and make necessary changes.

2.6.2.6 Document, deliver and place under configuration control.

2.6.3 GUI Development

2.6.3.1 Coordinate/Identify customer requirements for each analysis tool GUI/module

2.6.3.2 Develop prototype GUI code for each module and integrated GUI.

2.6.3.3 Conduct preliminary design reviews and make necessary changes.

2.6.3.4 Develop final GUI code for each module and integrated GUI.

2.6.3.5 Conduct verification testing of each module and integrated GUI.

2.6.3.6 Conduct design reviews and make necessary changes.

2.6.3.7 Document, deliver and place under configuration control.

2.6.4 Support RSRM related design reviews. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.6.5 Support RSRM related testing, including assessments of test plans, test procedures, and test reports. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.6.6 Support RSRM anomaly investigations and failure investigation teams. Identify and pursue resolution of issues. Document and deliver results with recommendations.

2.6.7 Document Ignition Transient Program and deliver report.

2.6.8 Develop and deliver a steady-state ballistic performance analysis Technical Memorandum.

2.6.9 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and

negotiated with Task Lead and Task Initiator on a case-by-case basis.

2.6.10 Collect inputs: Motor configuration, propellant characteristics, launch / test conditions, launch / test telemetry.

2.6.11 Create and/or modify ballistic performance modeling algorithms as appropriate.

2.6.12 Generate model input data files.

2.6.13 Perform internal ballistic performance analyses.

2.6.14 Compare results to requirements, historical experience, statistical analyses, and contractor results.

2.6.15 Update performance database.

2.6.16 Document and deliver results with recommendations.

2.6.17 Other technical assessments and evaluations technical approaches will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis

3.0 Discussion of Skills Required

3.1 Subelement –01, Reusable Solid Rocket Motor

Senior and Journeyman Engineers with knowledge of solid propellant performance characteristics and subcontractors with specific expertise in Solid Rocket Motors. Engineer with Igniter Design and Performance Experience. Entry Level (b)(4) Engineer with solid rocket motor systems engineering experience and requirement development. Engineer with specific knowledge of solid rocket motor case, joints and seals.

3.2 Subelement – CA, Crew Launch Vehicle First Stage

Senior Engineers with knowledge of solid rocket motor systems engineering and subcontractors with specific expertise in Solid Rocket Motors. Entry Level (b)(4) Engineer with solid rocket motor systems engineering experience and requirement development. Engineer with specific knowledge of solid rocket motor case, joints and seals.

3.3 Subelement – CB, Ares I-X First Stage (This subelement was closed under Revision 09.)

Senior Engineers with knowledge of solid rocket motor systems engineering and subcontractors with specific expertise in Solid Rocket Motors.

3.4 Subelement – AA, Ares V(This subelement was closed under Revision 03.)

Senior Engineers with knowledge of solid rocket motor systems engineering and subcontractors with specific expertise in Solid Rocket Motors.

3.5 Subelement – AB, Heavy Lift Booster

Senior Engineers with knowledge of solid rocket motor performance and experience performing solid/liquid motor trade studies with specific expertise in Solid Rocket Motors.

3.6 Subelement –SA, Reusable Solid Rocket Motor

Senior Engineers with knowledge of solid rocket motor systems engineering and solid propellant performance characteristics. Previous experience with RSRM and SRB components and systems is desired.

4.0 Special Tools Required

All computer hardware and software will be provided by NASA MSFC.

5.0 Participating Subcontractors

(b)(4)

Subelement –AA; None
Subelement –AB; None
Subelement –SA; None

6.0 Milestones & Deliverables

Work is primarily driven by milestones that are set by the project customers, and are not within the control of the Task. Deliverables will be formatted as presentations, reports, and letters documenting findings, issues, meetings, trips, etc., as scheduled on a case by case basis. Reports documenting significant tasks will be provided as they are completed. Progress of efforts and significant issues will be formally documented in Monthly Activity Reports provided in the (b)(4)

Milestones for technical assessments and evaluations as specified above, will be coordinated between NASA and technical personnel to perform the efforts, and negotiated with Task Lead and Task Initiator on a case-by-case basis.

The currently agreed Milestones and Deliverables are reflected in the schedule in Section 9.

7.0 Special Considerations (Recruiting, Special Equipment / Material, Safety, etc.) CY6

7.1 Subelement -01, Reusable Solid Rocket Motor

None

7.2 Subelement -CA, Crew Launch Vehicle First Stage

None

7.3 Subelement -CB, Ares I-X First Stage (CY05 use, Closed with Revision 09)

None

7.4 Subelement -AB, Heavy Lift Booster

None

7.5 Subelement -SA, Reusable Solid Rocket Motor

Travel: (b)(4) to support postflight motor assessment
Training: (b)(4) for professional development

8.0 Work Shelf

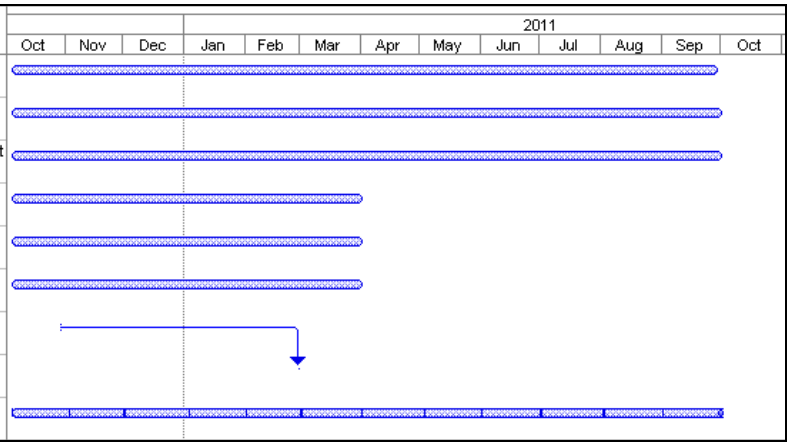
The following activities could be accomplished as part of the Task Order performance by personnel that are temporarily available due to program or funding delays on other Tasks. Specific assignments will be coordinated with the Task Initiator to ensure appropriate skills and experience.

TO/Subelement	Description	Due Date	Skill

NA

9.0 Schedule – Schedule is baseline only, reference Monthly Activity Report for detailed, updated schedule with milestones.

ID	S/E	Work Element
264	00	Solid Launch Systems and Analysis
265	AB	**Heavy Lift Booster**
266	AB	Heavy Lift Booster Systems Engineering and Analysis Support
267	SA	**Shuttle Reusable Solid Rocket Motor First Stage**
268	SA	Support RSRM Integrated Project Teams
269	SA	Provide RSRM launch and Post-Launch Support
270	SA	STS-133 - October 29, 2010
271	SA	STS-134 -February 28, 2011
272	00	**Monthly Activity Reports**



ESTS Contract Task Order Request Performance Plan

Task Order Title: Solid Launch Systems and Analysis

Task Order Number: 33-050101 Revision: 12

Category	Weighting Technical %	End of Period Technical Score
Technical Objectives	65%	X 65% = **Justification**
1. Perform prediction and reconstruction analysis for RSRM/Heavy lift Booster and ignition, transient and steady state – nominal and off-nominal conditions as appropriate to support test and flight program 2. Support development and validation of enhanced user interface program for performance reconstruction codes. 3. Support development and validation of alternate solid propellant burn-back/geometry analysis tools for implementation in place of SPP codes 4. Document development and use of analysis tools and methodologies as appropriate for future reference. 5. Provide system and component engineering support to ER50, Integrated Product Teams, and the Programs/Projects described in the subelements of this Task Order. 6. Demonstrate ability to discover “gaps” in designs, program/project requirements, work products, training, and capabilities. Develop and communicate plans to close gaps. 7. Communicate results, issues, action items, etc., to both NASA and Jacobs ESTS management. 8. Demonstrate initiative in taking independent actions when required. 9. Communicate ideas for improvement of current efforts. 10. Work accuracy and level of detail is appropriate for intended use. 11. Tools and methodologies applied are appropriate for intended use. 12. Work is of appropriate quality. 13. Resources assigned exemplify appropriate technical		

ESTS Contract Task Order Request Performance Plan

Task Order Title: Solid Launch Systems and Analysis

Task Order Number: 33-050101 Revision: 12

knowledge. 14. Progress and results are appropriately documented. 15. Results, issues, actions items, etc., are appropriately communicated and exemplify appropriate knowledge. 16. Demonstrate continuous improvement. 17. Maintain a team working relationship between ER50 and Task Order personnel. 18. Assure that the customers of ER50 are delighted with the products provided representing the division. 19. Level of technical oversight required is appropriate for resources and work assigned.		
Schedule Objectives (Milestones)	**Weighting Schedule %** 10% *(min 10%)*	**Schedule Score** X 10% = **Justification**
1. Unless otherwise noted, milestones and deliverables are defined on a case-by-case basis as coordinated be-tween the Task Initiator and Task Lead. 2. Milestones and action item delivery schedules must be met. 3. Work progression is appropriate for action assigned. 4. Resource loading commensurate with task schedule. 5. Prediction and reconstruction preparation completed on time to support test and flight analysis and reporting. 6. Flight Performance reconstruction reports complete: Quicklook – L+12 hours, Final Briefing package at L+5 days, deliverable L+30 days unless otherwise negotiated with Task Initiator. 7. Test Performance reconstruction reports complete: Quicklook – T+2 days, Final report and deliverable T+30 days unless otherwise negotiated with Task Initiator 8. Exemplify ability/willingness to adjust changing priorities. 9. Response to action items are timely.		

ESTS Contract Task Order Request Performance Plan

Task Order Title: Solid Launch Systems and Analysis

Task Order Number: 33-050101 Revision: 12

Cost (actual vs. negotiated)	**Weighting Cost%** 25% *(min.25%)*	**Cost Score** X 25% =
		Justification
	Weighting Total % 100.00%	**Total Score**

Technical, Schedule, and Cost Grading Scale

Score	Description
9.0-10.0	Exceeded TO Performance Plan objectives resulting in major benefit(s)
8.0-8.9	Exceeded TO Performance Plan objectives resulting in modest benefit(s)
7.0-7.9	Met TO Performance Plan objectives
3.0-6.9	Did not meet all TO Performance Plan objectives resulting in minimal impact or requiring additional agency funds
0.0-2.9	Did not meet TO Performance Plan objectives resulting in substantial impact and/or requiring additional agency funds

ESTS Contract Task Order Request Performance Plan

Task Order Number: Solid Launch Systems and Analysis

Task Order Number: 33-050101 Revision: 12

Comments:

Marshall Space Flight Center
Engineering, Science & Technical Services

JACOBS
ESTS Group

Risk Assessment

Contract Number: *NNM05AB50C*
TO Title: *Solid Launch Systems and Analysis*
TO Number: *33-050101* **Revision:** *12*

Period of Performance: *10/02/2010* to 09*/30/2011*

MSFC Initiator: *Robert Taylor*

(b)(4)

Task Order Risk Assessment to Cost, Technical, and Schedule

List identified risk associated with Task Order performance as related to task cost, technical, and schedule. Classify the risk(s) according to probability of occurrence and impact as defined below and enter the risk into risk matrix.

Risk	Risk Type	Probability (1-4)	Impact (1-4)	Risk Description
Risk C1	Cost	1	1	Staffing commensurate with funding. Negative programmatic cost risk impacts are avoided through reviews. Only positive programmatic cost impacts are expected.
Risk T1	Technical	1	1	Technical knowledge of personnel assigned appropriate for work assigned.
Risk S1	Schedule	1	1	Task schedule is driven almost exclusively by programmatic schedules. Negative programmatic schedule risk impacts are avoided through status reviews. Only positive programmatic schedule impacts are expected.

*Note: See page 2 for risk mitigation plan for those risks which are Primary Risk Drivers.

Task Order Risk Matrix

		1 Minimal Impact	2 Minor Impact	3 Medium Impact	4 Major Impact
Inevitable Occurrence (>95% Probability)	4	Y	Y	R	R
High Probability of Occurrence (>60% but <95% Probability)	3	G	Y	Y	R
Medium Probability of Occurrence (>25% but <60% Probability)	2	G	Y	Y	Y
Low Probability of Occurrence (<25% Probability)	1	G	G	Y	Y

Legend

- R — **Primary Risk Driver:** Requires Risk Mitigation Plan
- Y — **Caution:** Requires status updates and general plan for risk reduction as determined necessary by Team Lead and Initiator
- G — **Watch:** No Action required

Impact Level	Cost Impact Definition	Technical Impact Definition	Schedule Impact Definition
(1) Minimal Impact	No significant cost impact	No significant technical impact	No significant schedule impact
(2) Minor Impact	Potential to recover cost	Potential to gain required technology without impact	Minor delay in deliverables but no impact to customer
(3) Medium Impact	>0 but <10% subtask cost overrun	Some technical impact but potential to recover	Delay in subtask deliverables but work arounds available and acceptable to customer
(4) Major Impact	>10% subtask cost overrun	Unable to meet technical requirements to perform subtask	Delay in subtask deliverables with impact to customer

Risk Mitigation Plan

Complete the following chart for those risks identified on page 1 as “Primary Risk Drivers”. The following chart will serve as the Risk Mitigation Plan.

Risk No.: Risk Description:		
Mitigation Step No.	Planned Completion Date	Mitigation Step Description