Marshall Space Flight Center
Engineering, Science & Technical Services

Task Order Plan (TOP)

Contract Number: *NNM05AB50C*
TO Title: *Engineering Program Management – Innovative Partnership Program*
TO Number: *30-000307* **Revision:** *04*

Period of Performance: *10/02/2010* to *9/30/2011*

MSFC Initiator: *Fred Schramm*

(b)(4) [redacted]

Emergency: *No*

Revision 04: The purpose of this revision is to define scope and add estimate of work for the period October 2, 2010 through September 30, 2011 for subelement 30-000307-01. The overall task order was increased by (b)(4) [redacted]

Revision 03: 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. Addtionally, the Schedule, Performance Plan and Risk Assesment have been revised to relect changes in task activities for the new period of performance. At this time there is no estimate for subelement 30-000307-01for CY6. Future funding is expected for subelement -01.The Task Order will be revised to additional scope and estimate at that time. Subelement -02 continues in CY6.

Revision 02: The purpose of this revision is to change the scope of work under subelement -01 per the request of the customer to remove the work performed with (b)(4) [redacted] providing new binders for conductive inks in printed light sources and photovoltaics for lunar applications. Analysis, identification, synthesis, and characterization of chemical compounds as they relate to the patents and products inherent to space act agreements and licenses with (b)(4) [redacted] will no longer be undertaken. The scope of work change reduces the amount of subcontract resources needed to support Subelement -01 by (b)(4) [redacted]
Additionally, this revision increases the scope of work by means of a subject matter expert to the Innovative Partnerships Program Sub-element -02 Ionic Liquid Study. Additional scope of work is defined as the extraction of metals from lunar simulant by electrolysis in ionic liquid. Regeneration of spent acidic ionic liquid following dissolution of simulant, and consulting on preliminary design of hardware to incorporate all aspects of extracting oxygen and metals from simulant into a single end-to-end process This revision defines and estimates work for the period May 10th, 2010 through October 14, 2010. The additional support increases the amount of subcontract resources needed to support Subelement -02 by (b)(4) [redacted] The overall task order was increased by (b)(4) [redacted]

Revision 01: The purpose of this revision is to extend this task into Contract Year 5 of the NNM05AB50C ESTS contract. This revision defines and estimates work for the period October 03, 2009 through October 14, 2010. Additionally, the Schedule, Performance Plan and Risk Assesment have been revised to relect changes in task activities for the new period of performance.
This revision also adds Subelement -02 and the necessary resources for additional support to the Innovative Partnerships Program for Contract Year 5 of the NNM05AB50C ESTS contract.

1.0 Task Order Description & Objectives

The ESTS Group shall provide science support to the Innovative Partnerships Program (IPP) for the analysis, identification, synthesis, and characterization of chemical compounds as they relate to the patents and products inherent to space act agreements and licenses with (b)(4) (b)(4) The ESTS Group shall identify and define mechanisms involved in related innovative chemical processes and work with the commercial partners and government to produce the chemical compounds in limited quantities (materials supplied by the space act partners) for test and evaluation by MSFC and commercial/academic test organizations. The science support involves technologies that include but are not limited to aqueous based dry film lubricants for NASA applications and ionic fluids for improving the performance of various formulations. The ESTS Group shall be supportive of IPP efforts to transition these technologies to products during a commercialization phase.

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

Subelement 01 – Chemical Science

Jacobs ESTS Group will analyze, identify, synthesize and characterize chemical compounds for aqueous based dry film lubricants, and ionic fluids in support of the IPP. This will involve identifying and defining mechanisms involved in related chemical processes and working with government and commercial partners to produced chemical compounds in limited quantities. Jacobs ESTS Group will also support IPP efforts to transition these technologies to commercial products.

Subelement 02 – Ionic Liquid Study

Jacobs ESTS Group will 1) conduct a study to synthesize ionic liquids for solubilizing lunar regolith (simulant) to conduct solubilization experiments, and 2) Perform electrolysis on the solutions for the purpose of extracting oxygen and metals from the solution, with a goal to regenerate the ionic liquid so that it can be re-used to process additional regolith in support of the IPP. This will involve identifying and defining mechanisms involved in related experiment processes and working with government and commercial partners to conduct the study.

3.0 Discussion of Skills Required

This effort requires the support of a senior chemist with at least a MS in Chemistry or related field. The chemist shall have experience with water based dry film lubricants, ionic fluids and binders. Additionally subelement 02 requires the support of a physicist with least a MS in Physics or related field. The physicist shall have experience with extraction of metals from lunar simulant by electrolysis in ionic liquid.

4.0 Special Tools Required

None

5.0 Participating Subcontractors

(b)(4)

6.0 Milestones & Deliverables

Deliverables will include: monthly activity reports, meeting minutes, presentations, and action items as required.

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

None

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

9.0 Schedule

Task Order #	SubElement	Task Work Element	2011												
			Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
30-000307	01	Chemical Science													
30-000307	02	Ionic Liquid Study													

ESTS Contract Task Order Request Performance Plan

Task Order Title: Engineering Program Management – Innovative Partnersh

Task Order Number: 30-000307 Revision: 04

Category	Weighting Technical %	End of Period Technical Score
Technical Objectives	65%	X 65% =
		Justification
• Support to the IPP in the analysis, identification, synthesis, and characterization of chemical compounds. • Identify and define mechanisms involved in related innovative chemical processes and work with the commercial partners and government to produce the chemical compounds in limited quantities. • Support IPP efforts to transition these technologies to products during a commercialization phase. • Support IPP efforts to study methods to synthesize ionic liquids for solubilizing lunar regolith (simulant) to conduct solubilization experiments. • Support IPP efforts to perform electrolysis on the solutions for the purpose of extracting oxygen and metals from the solution, with a goal to re-generate the ionic liquid so that it can be re-used to process additional regolith.		
	Weighting Schedule %	**Schedule Score**
Schedule Objectives (Milestones)	10% *(min 10%)*	X 10% =
		Justification
No specific schedule has been defined, but documentation shall be provided as required to meet IPP products and project milestones.		
	Weighting Cost%	**Cost Score**
Cost (actual vs. negotiated)	25% *(min.25%)*	X 25% =
		Justification

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	Weighting Total %	Total Score
	100.00%	

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

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Comments:

Marshall Space Flight Center
Engineering, Science & Technical Services

JACOBS
ESTS Group

Risk Assessment

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(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	2	One person task. Support can't be spread out.
Risk C2	Cost			
Risk T1	Technical			No technical risks were identified for this task.
Risk T2	Technical			
Risk S1	Schedule			No schedule risks were identified for this task.
Risk S2	Schedule			

*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