

## Findings

### **Sounding Rocket Working Group**

National Aeronautics and Space Administration

Meeting of June 18/19, 2009

#### **1. Impending Loss of Critical Engineering Work Force**

##### *Summary*

The Sounding Rocket Working Group is alarmed to find that 30 critical engineers and technicians will be terminated from the NASA Sounding Rocket Operations Contract on July 1, 2009. The program depends on these highly skilled individuals, many with decades of experience, not only for their knowledge of existing, highly specialized systems, but also for their ability to design, construct, and test sophisticated sounding rocket payloads at low cost. The loss of this unique and highly experienced body of engineers at the Wallops Flight Facility and at the White Sands Missile Range is likely to have serious and lasting repercussions to innovative space research and technological development for many years to come, placing the health and future of the nation's sounding rocket program at high risk. We urge the Sounding Rocket Program Office to use all means available, including those at the highest levels of NASA management, to avert this crisis and prevent any disruption of the sounding rocket engineering team.

##### *Background*

At its meeting on June 18, 2009, the Sounding Rocket Working Group (SRWG) was informed that Northrop Grumman (NG), the prime contractor for the NASA Sounding Rocket Operations Contract (NSROC), had announced earlier this month that it intends to terminate its teaming relationship with its subcontractor, Orbital Sciences Corporation (OSC), on June 30, 2009. In consequence, OSC personnel will no longer participate in any NSROC activities. The SRWG was informed that since both NG and OSC are intending to compete for the role of prime contractor in response to the upcoming NSROC II solicitation, the teaming relation would be terminated to allow each company to protect the confidentiality of their separate proposal strategies. Although the current 10-year NSROC contract ended on January 31, 2009, it has since been operating under an extension that applies until June 30, 2009. However, NASA intends to add an additional year to this extension period in order to allow sufficient time to negotiate and establish the new NSROC II contract. Indeed, release of NASA's Request for Proposal (RFP) for the NSROC II contract has been delayed until later this year, with an expected contract effective date of July 1, 2010.

The immediate consequence of terminating the OSC sub-contract is that the NSROC team will suddenly lose 30 highly skilled, experienced engineers and technicians, many who fill critical positions in the program, including the Chief Engineer and the supervisors and lead engineers of several technical departments, including Guidance, Navigation, and Control (GNC), Electrical Engineering (EE), and Mechanical Engineering (ME). The loss of personnel is most serious in the areas of GNC and EE, and will be felt at both the Wallops Flight Facility (WFF) and the White Sands Missile Range (WSMR).

NASA's sounding rocket program relies first and foremost on its cadre of highly skilled, highly experienced, and highly dedicated engineers. This relatively small engineering team represents a significant fraction of the NASA sounding rocket "corporate memory" which enables NASA to produce high quality, sophisticated payloads at extremely low cost. Indeed, various NASA review panels have identified the experienced workforce of engineering contractors as the prime reason for success of the NSROC I contract over the last 10 years.

Recovery from the loss of 30 key engineers will take many, many years, and will cost the program through reduced performance and by diversion of sorely-needed funding into training new personnel. The SRWG notes that the NSROC prime contractor has on numerous occasions emphasized the difficulty of finding skilled engineering staff, particularly given the remote locations of both the Wallops Flight Facility and the White Sands Missile Range. As a consequence, the program as a whole may be expected to slow considerably, with added risk to missions that must proceed with a high proportion of new and inexperienced staff. For example, there are currently five rockets scheduled for launch at WSMR in the next three months. These missions must now either be delayed, or else proceed, if it is indeed possible to do so at all, with serious risk due to the expected loss of key engineering expertise.

Cataclysmic turnover in this small and highly specialized workforce will be hugely and unpredictably disruptive to the program. The SRWG finds this situation alarming and serious, and urges that all available means be pursued to find a solution which averts this crisis.

## **2. Serious Concerns about "NSROC II" Contract Structure**

### *Summary*

We urge the Sounding Rocket Program Office (SRPO) to consider new approaches to the contract structure for NASA's sounding rocket program. The SRWG is seriously concerned that the new NSROC II contract structure does not represent an improvement to that of NSROC I. Rather, the new NSROC II contract structure could hinder innovative scientific experimentation while reducing the efficiencies and cost savings that are at the core of NASA's sounding rocket program. The SRWG suggests that the SRPO manage the NASA science missions in a more direct way, using a "services contract" as is currently used to provide contractor engineering services at the Goddard Space Flight Center. In this fashion, the sounding rocket program benefits from the advantages of both the pre-NSROC and NSROC periods, while achieving a more optimum means to meet the scientific and technological goals of the program.

### *Background*

In February 1999, after years of discussion and planning, the NSROC model replaced the established civil-servant led program. Civil servants had previously managed the program and directed teams, comprised of mostly contractors, to design, build, test, and launch sounding rockets for NASA. The change was enacted primarily to enable private industry to assume a larger role in carrying out NASA's sounding rocket program. The NSROC structure was also intended to save costs, provide more transparent accounting, and to initiate a vigorous external market for suborbital missions. By attracting outside customers for launch services, it was hoped synergy and increased economies-of-scale could be achieved that would benefit NASA.

Although some of these new aspects of the program have been realized, many of the intended goals and benefits were not effectively demonstrated during the 10 years of the initial NSROC contract. On the contrary, the SRWG observes serious deficiencies that will be either be carried into, or exacerbated by, the NSROC II contract structure. The SRWG provided some of its concerns regarding NSROC II in its Findings from its January, 2008 meeting. However, several aspects of the new contract structure had not been fully developed at that time. Further, as the potential loss of large numbers of key, experienced engineers has been revealed to us at this meeting, the SRWG concerns for the NSROC II contract have only deepened. Our most serious concerns are discussed below:

-- The purely incentive fee structure of NSROC II **seriously interferes with a goal-based program such as the sounding rocket program**. The lack of “award fee” and gradations in fee structure in NSROC II will put even more pressure on the experiment team to restrict mission success criteria to requirements that can be easily be met by the NSROC II contractor. In other words, principal investigators can be expected to be asked to “water down” their minimum success criteria in order for contract obligations to be more easily met.

-- The fee structure of NSROC II **will not encourage investigations that require *pushing-the-envelope***, even if past history shows there is a reasonable chance of attaining the required performance. Because the contractor has internal pressure to maximize their fee, they will have no incentive to agree to more ambitious requirements or, for that matter, any innovation whatsoever. We find this structure highly incompatible with the spirit and overarching goals of the Sounding Rocket Program that has been consistently heralded as an incubator for technical innovation and maximum science return.

-- The NSROC contract did not demonstrate that it saves substantial amounts of money for NASA. The SRWG sees even **less incentive under NSROC II for the contractor to aggressively seek efficiencies** and complete missions for less than their initial bids.

-- The new 5 year NSROC contract term (instead of 10 year) reduces program stability and efficiency, while producing considerable overhead. Further, the risk of losing a substantial fraction of key workforce each time the contract is re-competed, as discussed above in Finding #1, has the potential to **seriously disrupt the entire sounding rocket program** on a regular basis. (The anticipated loss of personnel on June 30, 2009, and the impending disruption to the program emphatically illustrate this point.) The sounding rocket program must be nimble and highly efficient to maintain a tempo of 20 or more missions a year, and even a small disruption can add risk, schedule delays, and loss of science return for multiple investigations.

The committee urges NASA to revisit the contractor-managed mission model and to compare this objectively with a government-led, and contractor-supported, “services contract” model such as is currently in widespread use at GSFC. Using government mission managers (or contractors under government supervision), coupled with a engineering service contract(s), such as the Multidisciplinary Engineering Development Services (MEDS), the Electrical Systems Engineering Services (ESES), and the Mechanical Systems Engineering Services (MSES) contracts at Goddard, would provide a much more efficient model for the sounding rocket program, promoting innovation and efficiencies, whose savings would be directly fed back to the program.

It is important to emphasize that many of the positive aspects of NSROC would be maintained under this new arrangement, such as the accountability and transparent reporting of time spent by personnel on individual projects. On the other hand, aspects of the program which were identified by the user community as serious problems with NSROC (see

Findings of the December, 2000 and January 2001 SRWG meetings) would be immediately resolved. These include, for example, problems regarding field operations where civil servant management is needed to resolve range issues that have direct impact on the NSROC contractor performance and fee. It also simplifies many other aspects of the program, such as the buying of hardware and the maintenance of inventory (rocket motors, for example). In this fashion, the sounding rocket program benefits from the advantages of both the pre-NSROC and NSROC periods, while maintaining the optimum arrangement to meet the scientific, technical, and educational aims of the program.

Given the extension of one year to the existing NSROC contract, we urge the SRPO to consider new approaches to the contractor support structure that are needed to ensure a healthy, efficient, and innovative Sounding Rocket Program for the foreseeable future.

### **NASA Sounding Rocket Working Group**

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