

Add Launch Installations Design as a Task Objective in the CEV and HLLV Proposal Process

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Focus Area: Launch Infrastructure

These comments are offered in response to the lack of reference in the RFI Focus Area document to the new launch installations that will be needed to support CEV and HLLV operations. Launch installations are not covered in the focus areas or topics, yet their provision will be a vital part of the CEV and HLLV development programs from flight testing onwards and they will need to be ready for the CEV by 2008. Given the long lead time needed for planning, design, environmental review, engineering and construction of launch installations, it is important that launch issues are included as task objectives in the CEV and HLLV proposal process so that proposing teams are made aware of their significance.

Delivering new launch facilities and infrastructure to support the CEV/HLLV program will involve major capital costs early in the program's cycle, resulting in risk of loss if the program is terminated, delayed or subjected to major revision. This is a not uncommon occurrence in the space field. It has occurred twice in the last two decades: first in the mid-1980s at Vandenberg Air Force Base when the Shuttle western launch complex was mothballed after the *Challenger* loss and second in the late 1990s in the Mojave desert when the X-33 prototype complex was abandoned after the vehicle was scrapped. Wasted public money ran to the hundreds of millions of dollars. This risk must be avoided by the new CEV and HLLV development programs.

On the positive side, there are opportunities to attract investment to the CEV/HLLV programs from non-Federal sources to cover the costs of new launch infrastructure. This process can be tailored to sustain employment, create commerce and improve tourism in any given region or area. In the 1990s, the promise of the Venturestar RLV generated growing interest from several States beyond Florida in developing their own launch facilities to support the program. This interest continues and may emerge as a factor in bids to develop CEV/HLLV launch facilities in additional or alternative locations to Cape Canaveral. Though prospective sites to the north of the Cape's latitude would result in reduced ascent performance, the penalty may be acceptable if the benefits include major local or regional investment in launch infrastructure costs. On the other hand, prospective sites closer to the equator would result in improved ascent performance but move launch operations beyond the mainland USA. Resulting security

concerns could be addressed if international agencies or third world nations with suitable equatorial sites are invited to become partners from the outset. Whichever launch sites are chosen, local political, legislative, community and commercial stakeholders will demand and deserve a major role.

The twin attractions of non-Federal investment and improved trajectory performance must be balanced against growing ecological awareness and environmental concerns. Wherever CEV/HLLV launch facilities are located, some environmental review process will be involved. For new green field launch sites in the USA, this could be protracted and cause delays to an accelerated timetable. The decision to flight-test the X-33 prototype at Edwards Air Force Base in California led to overflight concerns, environmental reviews and public hearings in the Palmdale/Lancaster area that could have derailed the project. For new coastal or offshore launch sites beyond the USA, environmental issues may be less of a problem, providing local concerns and issues are understood and tackled from the outset.

The quality of the design and engineering of the CEV and HLLV should be matched by a similar effort applied to launch facilities and infrastructure. Well-designed launch installations will be essential to maximize operational safety and minimize operational costs. Vehicle and facility operations must work together in harmony and efficiency with the objective of reducing time and resources. Something can be learned from looking at well-planned airports. Simplification of procedures will result in simplification of hardware leading in turn to reduced capital costs. There is a need for better engineering design. There is no reason why the three-dimensional jigsaw puzzle of steelwork of a launch structure has to look like a badly-designed colliery or refinery. Something can be learned from architecture where elegant and well-engineered steel frames are now the rule rather than the exception for all kinds of buildings. Good design is good business and serves another important purpose. Launch installations are an important “shop window” for the public to view space operations. Since public money supports the nation’s space activities, public access to launch facilities as tourists, children or students must be better than in the past. Improved provisions for visits to launch facilities and observation of launches and landings will be needed. The public must be made to feel less excluded and more welcomed in its contact with space operations.

To summarize:

- Well-designed, safe and efficient launch facilities will be crucial to the safe and efficient operation of the CEV and HLLV;
- Designs of the CEV and HLLV will directly influence the design of their launch facilities and vice versa and they must be coordinated and developed in parallel;
- Planning, engineering and constructing CEV and HLLV launch facilities will involve a long lead time and can become a critical path item;
- Growing ecological awareness may require special environmental review of new CEV and HLLV launch facilities, extending the lead time further;
- Costs of CEV and HLLV launch facilities acquisition and operation will be a major and unavoidable constituent of overall program costs;

- New CEV and HLLV launch facilities will involve local political, legislative, community and commercial interests and stakeholders;
- Optimization of CEV and HLLV ascent performance may indicate the need to study alternative global launch sites;
- Some States throughout the US with interest in spaceports may wish to participate in CEV and HLLV initiatives;
- Alternative geographical locations for the CEV and HLLV launch complexes may be an appropriate subject for international and Third World cooperation;
- Financial aspects of new launch infrastructure for the CEV and HLLV can be tailored to attract non-Federal, State-based investment;
- Tourist and educational access to new CEV and HLLV launch facilities will be an important public relations tool before and during launch operations;
- New launch installations for the CEV and HLLV will become a “shop window” to the program and their design deserves the same level of care and attention as the vehicles.

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