

**MINIATURE KILL VEHICLE (MKV) SYSTEM
DEVELOPMENT CONTRACT**

STATEMENT OF OBJECTIVES

SW-KEID-13-03

September 12, 2003

ATTACHMENT 1

STATEMENT OF OBJECTIVES
MINIATURE KILL VEHICLE (MKV)
SYSTEM DEVELOPMENT CONTRACT

1.0 Program Overview

Three prime contractor teams under USASMDC BAA contracts completed a one-year system concept development effort culminating in a System Design Review I (SDR I) on 25-27 February 2003. Following SDR I, the three teams began preliminary design of the kill vehicle (KV) and component risk reduction efforts leading to a kill vehicle Preliminary Design Review (PDR) in Sept 2003. System concept refinement tasks will continue under the BAA contracts through PDR to ensure that emerging kill vehicle designs are balanced against the overall MKV system. System level objectives for this follow-on MKV System Development Contract are provided herein; however, detailed performance standards will be provided in task orders as appropriate. The following government technical direction from the MKV System Concept Development contract (BAA contract) is also applicable to this acquisition: "Nuclear Radiation Levels for the MKV System" dated 22 May 2003; Memorandum "Radiation Environment, System Performance Guidance and Booster Data for the Miniature Kill Vehicle (MKV) Program" dated 23 May 2003; "Miniature Kill Vehicle Kinematics on GMD Candidate Boosters" dated 12 May 2003; "Booster Input Data" dated 12 May 2003; "MKV Reference Threats and Architecture Data" dated 31 October 2002; and "Instructions for MKV System Performance Assessments Revision" dated 15 August 2003; briefing provided during October 2002 IPRs (filename Mulroy v2 10_22_03); "MKV Probability of System Effectiveness" dated 27 June 2003; "Interface Control Specification Ground-Based Midcourse Defense Fire Control and Communication and Ground-Based Interceptor" S742-10014, Rev D dated 23 May 2003; and "Guidance for SDR and TCDD" dated 15 January 2003.

The near term objectives of the MKV System Development Contract are to conduct kill vehicle risk reduction and component/subsystem hardware demonstrations prior to hover testing, complete Preliminary Design Review for the carrier vehicle (CV) with corresponding risk reduction efforts for critical CV components, and to conduct kill vehicle (KV) hover testing in the fourth quarter of FY05.

Kill vehicle development and demonstration will be the focus of the MKV program through FY05. However, since a major long-term objective of the MKV System Development Contract is system level flight testing in the Pacific Test Bed as early as FY08-09, CV and operational concept development to support this testing will be conducted in parallel with KV development and demonstration, but at a lower level.

2.0 Requirements

This is an IDIQ type contract; therefore, all requirements for contractor performance hereunder are subject to the ordering provisions of this contract and the issuance of task orders by the contracting officer. All such task orders, when issued, will be within the general scope of this Statement of Objectives.

2.1 Primary Objectives

System-Level Functions

- S1. Intercept multiple midcourse targets from one launcher;
- S2. Integration with the BMDS.

Carrier Vehicle Functions

- CV1. Weapon-to-target assignment and management of KVs.

Kill Vehicle Functions

- KV1. Navigation and flight to assigned acquisition basket;
- KV2. Target acquisition, aimpoint selection, and terminal homing.

2.2 Kill Vehicle Development

Kill vehicle tasks and milestones are as follows:

- A detailed design phase for the system flight test kill vehicle configuration shall be conducted. This phase shall include critical component and subsystem demonstrations (e.g., DACS hot fire tests) that shall be performed to support the design activity as required to ensure a minimum risk design. The government will approve contractor subsystem demonstration plans. Government provided lethality assessments and analyses will continue through FY04 providing relevant data to evaluate the miniature kill vehicles ability to destroy reentry vehicles and other threat objects. Government and contractor reviews of these assessments and analyses will be conducted prior to major kill vehicle design reviews with sufficient time to incorporate kill enhancement design improvements as needed. The contractor shall conduct a tailored KV Critical Design Review (CDR) using MIL STD 1521B as a guideline.
- Following the KV CDR, hover test vehicle integration shall be initiated with appropriate hardware-in-the-loop testing. To the maximum extent possible, the configuration of the hover test vehicle will be the same as the system flight test vehicle. Hover testing of the flight test vehicle configuration will start not later than 4QFY05. Up to two iterations of hover testing will be performed.
- Integration of KV flight test configurations shall be completed. The contractor shall conduct a free flight test ("fly-by") to validate the integrated KV performance in a flight environment followed by two intercept flight tests starting in 4QFY06 and continuing through 4QFY07. Intercept flight testing will be conducted using short to medium range boosters that can be controlled and launched from tactical ranges, or other cost-effective launch solutions.

2.3 Carrier Vehicle Development

CV development shall focus on the design, development, and ground testing of the CV to be demonstrated in the system flight tests during Pacific test operations. This includes CV to KV communications hardware and software. Existing and readily available subsystems and

technology will be used as much as practical. KV dispensing mechanisms may be implemented in payload designs separate from the CV, but clear traceability to full functionality should be incorporated. CV hardware integration complexity will be minimized and tightly controlled. Ground testing with KV hardware will be included in the development and test effort. The objective of this effort will be to provide sufficient functionality to conduct the system level flight test demonstrations. Demonstration of a fully operational prototype carrier vehicle is not required.

CV development milestones include:

- CV PDR: FY05;
- CV CDR: FY06;
- CV ground testing and HWIL: FY07;
- CV for system flight tests: ready for integration with the kill vehicle and flight test payload in late FY07.

2.4 System Integration & Test

The contractor shall conduct a system integration and test effort in parallel with KV and CV development activities and continue those activities through system flight testing in the Pacific Test Bed in FY08 and FY09. The principal effort during this period will be low level kill vehicle and carrier vehicle requirements balancing and system design update as the kill vehicle and carrier vehicle designs progress through integration and testing.

Periodic System Design Reviews will be held before appropriate milestones in KV and CV development to ensure that the impact of any changes in these designs on the system design are identified, reconciled, and controlled. System Design Review (SDR) II will be held prior to the kill vehicle CDR and SDR III will be held prior to the carrier vehicle CDR. In-process reviews will be conducted as requested by the government and are expected to be held quarterly.

Generation of the algorithms and flight software associated with control and weapon target assignment (WTA) of the kill vehicles will be completed prior to KV intercept flight. A Software Specification Review (SSR) will be held in early in FY05. A CV PDR will be held in mid FY05 with a CDR in FY06.

Initial kill vehicle testing will be conducted without a CV; however, surrogate hardware and software packages will be used to support essential CV functionality necessary for limited flight demonstrations. A decision to proceed to Pacific test operations will be made in FY07 following completion of KV flight demonstrations and CV development and ground test of the CV.

The objective of flight tests within the Pacific Test Bed will be to demonstrate the ability of a CV to dispense and control several miniature KVs which acquire and intercept a number of threat objects at operational closing velocities. The government may choose to purchase, via Task Order, up to four prototype MKV systems in the final system flight test configuration each with a full load of KVs for additional testing or limited fielding.

The MKV System shall embrace a high degree of commonality with the evolving GMD testbed and deployment infrastructure, and the MKV payload shall be compatible with the boosters currently being developed for the GBI/EKV testbed and tactical systems. In addition to ground basing, the contractor shall investigate application of the MKV System concept to space basing

and consider space basing requirements in making MKV System design decisions. The contractor shall maintain and exploit common interfaces to the evolving BMDS cueing sensors, radars, and battle management structure.

2.5 Component Technology Development

The contractor shall conduct a parallel effort to develop component and subsystem technologies to enhance KV performance, reduce weight, lower cost, and match threat evolution. The primary focus of the component technology development effort will be on the KV, but CV technology may also be included. The component technology development effort will be at a lower level and on a not-to-interfere basis with the principal demonstration program. The government will make an insertion decision weighing risk versus benefit should improved subsystems become available for seamless insertion in the demonstration hardware as a result of the component technology development activities.

2.6 BMDS Coordination

In addition to maintaining cognizance of GMD testbed and deployment infrastructure to support MKV system commonality objectives referenced in paragraph 2.4, the contractor shall coordinate with MDA interceptor development programs and other BMDS activities.

3.0 Deliverables

Briefing Packages

Software Development Plan

Monthly Report

Final Report

OPSEC Plan

Contract Work Breakdown Structure

Cost Performance Report

Contract Funds Status Report

Design Review Data Package

Conference Minutes

Software Requirement Specification

Integrated Master Schedule

Documents Required by National Ranges

Program Management Plan

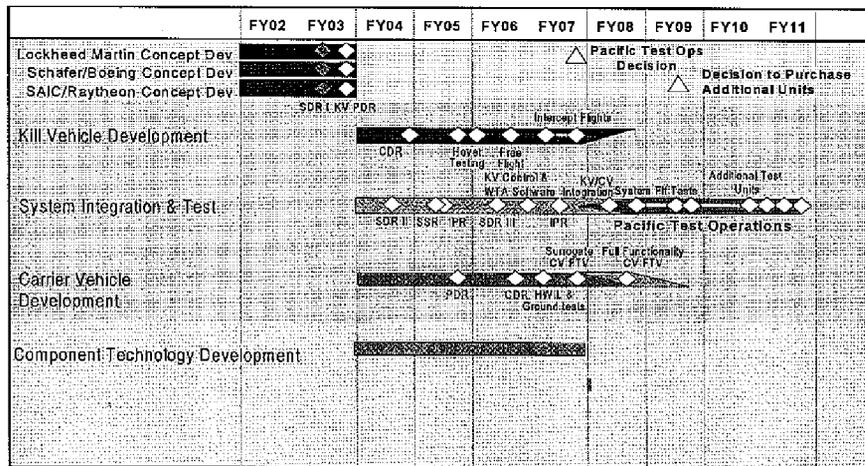
System/Subsystem Specification

Master Test Plan

Test Plan

- Configuration Management Plan
- Data Accession List
- Product Drawing and Associated Lists
- Test/Inspection Reports
- System Safety Program Plan
- System Safety Hazard Analysis Report
- Explosive Hazard Classification Data
- Software Test Plan
- Interface Requirement Specification
- Software Design Description
- Interface Design Description
- Cost Analysis Requirements Document

MKV Program Schedule*



*Schedule based on target award date of 1 December 2003. Significantly later award date will result in corresponding adjustment of Program Schedule.

MINIATURE KILL VEHICLE SYSTEM DEVELOPMENT

FY04 ACTIVITIES

TASK ORDER NUMBER 0001

ATTACHMENT 1a

1.0 TASK DESCRIPTION

This task order (TO) defines requirements for FY04 activities in support of the Miniature Kill Vehicle (MKV) System Development Program. The contractor shall perform kill vehicle (KV) development activities, carrier vehicle (CV) development activities, and system integration and test activities necessary to support the overall MKV Program objectives in accordance with the Statement of Objectives. Major milestones for this task order are a KV Critical Design Review in the fourth quarter of FY04 and a System Design Review in the last half of the year. The focus of activities under this task order will be on KV development with CV development proceeding but at a substantially lower level of effort.

With less than two years between start of the KV detailed design phase and hover testing, there will be time for only minimal component development. Use of readily available, low risk components will be emphasized. For higher risk key components, risk mitigation strategies must be maintained and kept available for contingency executions (after consultations with the Government) if necessary to meet program objectives.

2.0 TASK

2.1 Background

Prior to execution of this task, the contractor will have completed a system concept development effort that includes System Design Review I and the KV Preliminary Design Review.

Kill vehicle development and demonstration is the focus of the MKV program through completion of KV hover testing. However, since a major goal of the program is system level flight testing in the Pacific Test Bed, CV development and system integration and test planning to support this testing will be conducted in parallel, but at substantially lower levels.

2.2 Overall MKV Program Objectives

2.2.1 KV Objectives

KV1. Demonstrate navigation and flight to an assigned acquisition basket.

KV2. Demonstrate target acquisition, aimpoint selection, and terminal homing.

2.2.2 CV Objectives

CV1. Demonstrate weapon-to-target assignment and effective management of KVs.

2.2.3 System-level Objectives

S1. Demonstrate interception of multiple midcourse targets from a single launcher.

S2. Demonstrate successful integration into the existing ballistic missile defense system

2.3 Task Objective

The objective of this task is to continue KV detailed design and development culminating in a KV CDR and to support demonstrations of the overall program objectives and continue CV development and system integration and test activities at a low level leading to System Design Review II.

2.3.1 KV subtask

The contractor shall develop requirements and detailed designs for a KV for use in the flight test program. The contractor may develop new hardware and software components or may elect to infuse hardware and software components developed in previous and/or current technology efforts. To the maximum extent possible, the KV design presented at the CDR in the fourth quarter of FY04 will be the same as that for the KV that is planned to be hover tested in Task Order 2 and flight tested in future Tasks Orders. Long lead items to support the FY05 KV hover test shall be proposed as part of Task Order 1. Government approval will be required for any changes in the KV configuration proposed for any follow-on tasks.

2.3.2 CV subtask

The contractor shall conduct design and development activities to define a CV that provides sufficient functional capability to support the system level flight test demonstrations. Existing and readily available hardware and software subsystems and technology shall be used as much as possible. Periodic reviews of CV activities will be conducted under this task to assess the contractor's progress toward conducting a successful CV Preliminary Design Review under a future task.

2.3.3 System subtask

The effort during this period will consist of KV and CV requirements balancing and system design updates as the KV and CV designs mature. Both hardware and software interfaces will be matured commensurate with the fidelity necessary to support KV design needs through CDR.

System Design Review II shall be held prior to the KV Critical Design Review to ensure that the CV and KV designs are compatible or, if not, that potential conflicts are identified, reconciled, and controlled. System software development and interfaces will be preliminarily defined. Periodic In-Process Reviews will be conducted during both CV and KV design activities.

3.0 Deliverables

Briefing Packages	As Required
Monthly Report	Monthly
Cost Performance Report	Monthly
Contract Funds Status Report	Monthly
Design Review Data Package	As Required
Conference Minutes	As Required
Software Requirement Specification (KV Only)	As Required
Integrated Master Schedule	Monthly
System/Subsystem Specification	As Required
Configuration Management Plan	As Required
Data Accession List	As Required
System Safety Program Plan	As Required
System Safety Hazard Analysis Report	As Required
Software Test Plan	As Required
Interface Requirement Specification (KV-CV Interface Only)	As Required
Software Design Description (KV Only)	As Required
Interface Design Description (KV-CV Interface Only)	As Required

4.0 Program Management. The contractor shall implement a system to ensure integrated cost, schedule, and technical performance management and shall conduct periodic reviews to assess the degree of completion of technical and programmatic efforts. The contractor shall manage and track data and related correspondence and support interface/integration activities.

4.1 Integrated Cost, Schedule and Technical Performance Management. The contractor shall implement, document, and use an earned value based management system compliant with the contractor's earned value management system (EVMS) for integrated cost, schedule, and technical performance management. The contractor shall report EVMS information to the government using the cost performance report (CPR) "no criteria" approach. The contractor shall flow down earned value management and reporting requirements to major subcontracts that, based on risk, schedule criticality, and dollar value, have the potential to impede the successful completion of the program. The contractor shall relate technical accomplishments with cost and schedule in contract performance reports and at reviews. The contractor shall maintain the contract work breakdown structure (CWBS) and the CWBS dictionary delivered with contract proposal.

4.2 Reviews. The contractor shall identify, conduct, and document reviews both formal and informal, to assess the degree of completion of technical and programmatic efforts related to major schedule milestones including, but not limited to design reviews, in-process reviews, and integrated baseline reviews. It is anticipated that formal technical reviews will be conducted quarterly. One copy of design review agenda and outline shall be submitted to the government for comments 30 days prior to the design review. The government will respond within 10 days of receipt of agenda and outline. One printed copy of material presented at reviews shall be provided to all review attendees. An electronic copy of all presentation materials shall be provided to each government and government support contractor represented. The contractor shall conduct a program review process to ensure complete insight into the program by the government. This review process shall include monthly informal cost, schedule, performance, and affordability status reviews and via e-mail weekly program status reports. The contractor shall identify milestones necessary for coordination of key elements and interfaces to accomplish an orderly, event-driven program. Actions items identified at reviews shall be documented, distributed, and tracked through an electronic database accessible by the government.

4.3 Data Management. The contractor shall manage the preparation, submittal, maintenance, and tracking of data and related correspondence to include the maintenance and submittal of a Data Accession List (DAL). The contractor shall develop and maintain the DAL in contractor format to provide a single objective repository of contractor and subcontractor analytic and technical information. It shall document evolution of KV and CV component and subsystem designs, traceability of performance requirements and their allocation to hardware and software configuration items, design margin assessments, component and subsystem test results, and integrated MKV system test results. The DAL shall reflect the current state of the MKV system design and be revised as the design matures. To facilitate data management, the contractor shall maintain requirements, engineering, logistics, and program data including a program management plan (PMP) and an integrated master schedule (IMS)] in an electronic database accessible by the government.

4.4 Interface/Integration Activities. The contractor shall provide technical support to the government in executing the MKV program. The contractor shall participate in technical interchange meetings and program management meetings as necessary.

4.5 Quality Assurance (QA). The contractor shall implement a quality assurance plan, IAW ISO 9001 and ISO 9000-3. The QA Plans specified by these requirements shall be included in the Data Accession List. The contractor's quality program shall ensure that all inspections/tests required by the contract requirements are contained in the contractor's production planning and manufacturing methods and are being performed and these same requirements must be flowed down to subcontractors and suppliers to ensure overall compliance to the contract.

4.6 Product Assurance (PA). The contractor shall plan and conduct a PA program that integrates PA requirements into the design, manufacture, and test of all MKV system hardware and software. The contractor's PA program shall be based on best practices to establish the necessary PA processes, controls, and approval authority to ensure that product quality, reliability, safety, and other system attributes are not compromised. Audits and analyses shall be conducted to ensure the major subcontractors and vendors are compliant with the PA program.

5.0 System Engineering. The contractor shall perform system engineering and specialty engineering to (1) define and allocate MKV system requirements and incorporate them into a design that derives and balances components, software, and simulation requirements; (2) ensure that design, development, test, data/data analysis; and performance demonstrations yield the results, documentation, and validated high fidelity simulation end products needed to satisfy the SOW. The contractor shall implement and maintain a PMP. The contractor shall maintain and provide to the government at specified intervals an IMS to manage all program activities described in the PMP.

5.1 Requirements. The contractor shall allocate requirements to the MKV design. This allocation shall be documented and maintained in the MKV System Specification and lower level specifications. As part of the requirements allocation process, the contractor shall conduct trade studies to assess affordability, producibility, and supportability by evaluating MKV performance requirements against projected or potential design, testing, manufacturing, maintenance, operations and support, and overall life cycle costs. The contractor shall define the MKV design margin assessment process and the reporting process for margin against the allocated performance requirements in the PMP. The contractor shall include requirements verification and validation plans for the integrated MKV system and major components, subsystems, ground support equipment, and interfaces to other test system elements in the PMP. The contractor shall provide the plans and processes for coupling requirements validation with design/critical issue resolution by integrating analysis, simulation, ground test, and flight test data. The PMP shall provide a risk assessment, mitigation, and management approach. The IMS shall establish the traceability from the PMP to the design, development, fabrication, integration, and test and evaluation planning to meet performance requirements.

5.2 Mission Planning and Test Requirements. The contractor shall plan a comprehensive and cost effective test program for the ground and flight tests. The contractor's test program shall consist of a logical sequence of ground and flight tests to validate and document performance of KV and CV components and the integrated MKV system as documented in the MKV System Specification and lower level specifications. Include particular emphasis on KV hover test and KV divert attitude control system static hot fire tests and HWIL tests that serve as precursors to the KV tests. The contractor shall ensure balance in the planning, development, and conduct of the test effort to meet system performance and safety requirements. The contractor shall define and document the ground and flight test objectives in the PMP. The contractor shall maintain the master test plan delivered with contract proposal.

5.3 Ground and Flight Test Planning. Ground and flight test planning shall include development of test schedules, master test planning per the PMP and IMS, and detailed test specifications/plans and procedures for major ground tests conducted under this Task Order. The contractor shall develop, as part of the test plan(s), a set of criteria by which the performance of components, subsystems, and integrated systems will be measured. Schedule risk mitigation techniques shall be employed. The contractor shall plan for test data acquisition, handling, and analysis.

5.4 Configuration Management. The contractor shall develop and maintain a configuration management program to ensure control of the documentation, hardware and software that will be used in the program. A Configuration Management Plan (CMP) shall be prepared and implemented. The contractor's CMP shall describe the processes, methods, and procedures to be used to manage the functional and physical characteristics of the assigned configuration items (CI) under the program. The contractor shall implement a configuration control function that ensures regulation of the flow of proposed changes, documentation of the complete impact of the proposed changes, and release only of approved configuration changes into CI's and their related configuration documentation. The contractor shall also implement a configuration identification process to incrementally establish and maintain a definitive basis for control and status accounting for each CI throughout the program cycle. The KV and CV designs shall be controlled IAW the approved CMP not later than immediately following their respective CDRs.

6.0 Specialty Engineering. The contractor shall conduct specialty engineering efforts to execute the MKV program. Processes, methods, and procedures utilized to implement these specialty engineering activities shall be identified and defined in the PMP and IMS. Status of these efforts shall be discussed during program reviews.

6.1 Environmental, Safety, and Health. The contractor shall implement practices and initiatives throughout the life of the program to ensure that all program activities are environmentally compliant, that both system safety and health requirements are met, hazardous materials are minimized and controlled and that pollution prevention measures are observed. The ESH considerations to be addressed during design, fabrication, integration, testing and fielding shall address the following:

6.1.1 Environmental Protection. The contractor shall assist the Government's assessments required by the National Environmental Policy Act (NEPA) (42 USC 4321-4370d) implementing regulation 40 CFR 1500-1508 and 32 CFR Part 651. If necessary, the contractor shall provide a description of proposed contractor actions along with qualitative and quantitative data describing the constituent materials, emissions, effluents, wastes, and hazardous materials used in and produced from these activities.

6.1.2 Hazardous Material Management. The contractor shall not use, or require the use of substances listed in Emergency Planning and Community Right-to-Know Act (EPCRA) Section 313 "toxic chemicals" and EPCRA Section 302, "extremely hazardous substances" (available at: <http://www.epa.gov/ceppo/pubs/title3.pdf>) nor the use of

substances identified in the EPA 17 list (available at: <http://www.epa.gov/opptintr/3350/33finb1.htm>) in the design, fabrication, integration, or test activities associated with the MKV program unless written approval is provided by the government via the engineering change process. The contractor shall not use any Class I Ozone Depleting Chemicals/Ozone Depleting Substances (ODC/ODS), listed at <http://www.epa.gov/ozone/ods.html>) in the manufacture of items required by this task order, unless a waiver is obtained from the government. The contractor shall minimize the use of other hazardous materials and Class II ODSs. The contractor shall provide immediate notification of any proposed hazardous material mitigation/elimination efforts that may adversely impact schedules, cost and/or performance. The contractor may use NAS411 as a guide for implementing a Hazardous Materials Management Program (HMMP). The HMMP will be prepared IAW DI-MISC-81398 and results of the HMMP shall be made available to the government IAW DI-MISC-81397.

The contractor shall prevent pollution to minimize program environmental and cost impacts and ensure that all pollutants whose generation cannot be prevented will be recycled or disposed of in an environmentally safe manner.

6.1.3 System Safety/Health: The contractor shall plan, develop and implement a System Safety/Health Program for the MKV IAW DI-SAFT-81626. The System Safety/Health Program shall be integrated with the concurrent engineering processes used to develop, mature and support the MKV System. The contractor shall use MIL-STD 882D, as tailored by AR 386-16 and AR 385-10, in determining whether System Safety/Health engineering objectives are met.

6.1.3.1. System Safety/Health Program Plan. The contractor shall develop a System Safety/Health Plan, that defines safety/health activities, relationships to other contractor organizations and the overall MKV Program.

6.1.3.2 Safety Hazard Analyses. The contractor shall develop and/or update System, Subsystem, Operating and Support and Software Safety (top level and detailed level) hazard analyses to address KV design or peculiar modifications IAW DI-SAFT-80101. Analyses shall identify design and procedural hazards of safety critical components and operations of the KV throughout its life cycle. The analysis efforts shall include a fault tree analysis of all catastrophic and critical events impacted by the KV design. A single hard copy of each final hazard analysis, complete with contractor's signed signature page shall be delivered to the Government for approval, IAW DI-SAFT-80101. Existing KV hazard analyses may be used to the fullest extent as applicable. The contractor shall institute a system for tracking hazards. This management control process should include the method to be used for determination of hazard resolution and safety compliance. Hazard resolution and safety compliance shall be demonstrated by evidence of implementing corrective actions to adequately control hazards. Data shall be made electronically available to the Government for residual risk acceptance

6.1.3.3 Eliminate or Reduce Hazards to Acceptable Levels. Hazards will be eliminated or reduced to an acceptable level through appropriate design and or materiel selection. Contractor shall use the following order of precedence to eliminate or control potential safety/health hazards.

a. Design for Minimum Risk – Unacceptable hazards and environmental conditions shall be eliminated or their associated risks mitigated by design when feasible.

b. Incorporate Safety Devices – Hazards or unacceptable environmental conditions that cannot be eliminated or controlled through design selection shall be controlled to an acceptable level of risk through the use of fixed, automatic or other protective safety design features or devices. Provision shall be made for periodic functional checks of safety devices.

c. Provide Warning Devices - Devices will be installed to detect hazardous or unacceptable environmental conditions that cannot be otherwise eliminated or controlled. Adequate warnings shall be provided to alert personnel of the hazard or unacceptable condition and afford sufficient time for personnel response.

d. Develop Procedure and Training – When all other reasonable possibilities of hazard resolution or environmental protection have been exhausted, procedural controls and specialized training may be used to counter hazardous or unacceptable environmental conditions and actions. Warning and inspections provisions and procedures will be used to detect and correct failures, malfunctions and, errors before the hazard or environmental damage manifests itself. In no case will a single warning or caution or other form of written advisory be the only form of risk reduction.

6.1.3.4 Insensitive Munition (IM). The MKV shall be designed to a Type V reaction in bullet and fragment impact, Fast Cook-Off and Slow Cook-Off tests and no Type I (detonation) reaction of acceptor in Sympathetic Detonation Test for final Government IM testing. The contractor shall make provisions within development plans to provide test assets in future task orders in the configuration specified in the government furnished IM test plan.

6.1.3.5 Explosives Hazard Classification. The contractor shall provide data for Interim Hazard Classification (IHC) IAW DI-SAFT-81299B.

6.1.3.6 Radioactive Material. No radioactive, carcinogenic, or highly toxic materials, as defined by 29 CFR (OSHA), current revision, shall be incorporated into the system without prior Government approval. A certification of compliance with this requirement shall be provided to government 30 days prior to CDR.

6.1.3.7 Contractor Facilities. All explosives and related dangerous material facilities and operations shall comply with DOD 4145.26-M for Privately Owned, Privately Operated (POPO) contractor facilities. If Government Owned, Contractor Operated

(GOCO) facilities are used, the contractor shall comply with the providing service explosive standards.

6.1.3.8 Safety Tests. The contractor shall plan safety tests on all new or modified explosive items of the MKV system. The plans shall include drop tests (in packaged configuration) to verify (1) no functioning of any energetic portion of the KV and CV, (2) no rupture of the test item(s) which dislodges or disrupts explosives material, (3) the item is safe to handle and dispose of by normal EOD procedures and, (4) all safety devices remain in the safe condition. The contractor shall ensure safety test plans and strategies are compatible with GBI/EKV testbed and tactical system development safety requirements. An IM test program will be managed by the Government as described in paragraph 6.1.3.4. The contractor developmental plan shall include an asset (in packaged configuration) for the Government conducted test.

6.2 Operations Security. The contractor shall prepare an Operations Security (OPSEC) Plan or an Annex to a previously approved plan for the MKV program. The OPSEC Plan or Annex shall identify the perceived collection threat to the contractor's portion of the MKV program, essential elements of friendly information, identified vulnerabilities, and protective counter measures that the contractor will employ to protect relevant sensitive unclassified information.

6.3 Threat Intelligence Information. The contractor shall use government furnished threat definitions in all planning, analysis, and testing documents where intelligence and threat information is required. The contractor shall coordinate any additional requests for intelligence and threat materials through the contracting officer's representative (COR) to ensure that the most current Defense Intelligence Agency validated sources are used in planning, analysis, and testing documents. Threat positions or assessments developed by the contractor shall be submitted to the COR for approval and/or validation.

7.0 Facilities. The contractor shall perform analyses/studies required to define/modify existing facilities for ground testing. The contractor shall provide input for site surveys, environmental impact documentation, facilities planning, and preliminary facility design efforts if required.

8.0 Period of Performance: 1 December 2003 – 30 November 2004

9.0 Task Order Monitor

The Task Order Monitor for this effort is [REDACTED]

MINIATURE KILL VEHICLE SYSTEM DEVELOPMENT

FY05 ACTIVITIES

TASK ORDER NUMBER 0002

ATTACHMENT 1b

1.0 TASK DESCRIPTION

This task order (TO) defines requirements for FY05 activities in support of the Miniature Kill Vehicle (MKV) System Development Program. The contractor shall perform kill vehicle (KV) development activities, carrier vehicle (CV) development activities, and system integration and test activities necessary to support the overall MKV Program objectives in accordance with Statement of Objectives. Major milestones for this task order are at least one KV hover test series, a System Software Review, and a CV Preliminary Design Review. The focus of activities under this task order will continue to be on KV development with CV development proceeding but at a substantially lower level of effort.

With less than two years between start of the KV detailed design phase and hover testing, there will be time for only minimal component development. Use of readily available, low risk components will be emphasized. For higher risk key components, risk mitigation strategies must be maintained and kept available for contingency executions (after consultations with the Government) if necessary to meet program objectives.

2.0 TASK

2.1 Background

Prior to execution of this task, the contractor will have completed a system concept development effort that includes System Design Review (SDR) I and the KV Preliminary Design Review. Additionally, the contractor will have completed the KV Critical Design Review and SDR II under Task Order 1.

Kill vehicle development and demonstration is the focus of the MKV program through completion of hover testing. However, since a major goal of the program is system level flight testing in the Pacific Test Bed, CV development and system integration and test planning to support this testing will be conducted in parallel, but at substantially lower levels.

2.2 Overall MKV Program Objectives

2.2.1 KV Objectives

KV1. Demonstrate navigation and flight to an assigned acquisition basket.

KV2. Demonstrate target acquisition, aimpoint selection, and terminal homing.

2.2.2 CV Objectives

CV1. Demonstrate weapon-to-target assignment and effective management of KVs.

2.2.3 System-level Objectives

S1. Demonstrate interception of multiple midcourse targets from a single launcher.

S2. Demonstrate successful integration into the existing ballistic missile defense system

2.3 Task Objective

The objective of this task is to continue the KV detailed design and development activities culminating in a KV hover test and to continue CV development and system integration and test activities including a Software Requirements Review.

2.3.1 KV subtask

The contractor shall fabricate and test the KV design presented at the KV CDR. The KV configuration presented at the KV CDR will, to the maximum extent possible, remain the same as that for the KV that will be hover tested in this Task Order and flight tested in future Task Orders. Government approval will be required for any changes in the KV configuration proposed for any follow-on task orders. Periodic reviews of KV activities will be conducted under this task order to assess the contractor's progress toward meeting overall program objectives. Long lead items to support FY06 flight testing shall be proposed as part of Task Order 0002.

2.3.2 CV subtask

The contractor shall continue design and development activities to define a CV that provides sufficient functional capability to support the system level flight test demonstrations. Existing and readily available hardware and software subsystems and technology shall be used as much as possible. A CV Preliminary Design Review will be conducted. In addition, periodic reviews of CV activities will be conducted under this Task Order to assess the contractor's progress toward meeting overall program objectives.

2.3.3 System subtask

The effort during this period will consist of KV and CV requirements balancing and system design updates as the KV and CV designs mature. Both hardware and software interfaces for the MKV system will be matured to support a CV PDR.

A System Software Review shall be held prior to the KV hover test and CV Preliminary Design Review to ensure that the CV and KV designs are compatible from a software perspective or, if not, that potential conflicts are identified, reconciled, and controlled. Periodic In-Process Reviews will be conducted during both CV and KV design activities.

3.0 Deliverables

Briefing Packages	As Required
Software Development Plan	Update
Monthly Report	Monthly
Final Report	31 December 2005
Contract Work Breakdown Structure	Update
Cost Performance Report	Monthly
Contract Funds Status Report	Monthly
Design Review Data Package	As Required
Conference Minutes	As Required
Software Requirement Specification (KV & CV)	As Required
Integrated Master Schedule	Monthly
Documents Required by National Ranges	As Required
Program Management Plan	Update
System/Subsystem Specification	As Required
Master Test Plan	Update
Test Plan	As Required
Configuration Management Plan	Update
Data Accession List	Quarterly
Test/Inspection Reports	As Required
System Safety Program Plan	Update
Explosive Hazard Classification Data	As Required
Software Test Plan (GMD, KV-CV Update)	As Required
Software Design Description (KV & CV)	As Required
Interface Design Description (KV-CV Interface Only)	As Required

4.0 Program Management. The contractor shall implement a system to ensure integrated cost, schedule, and technical performance management and shall conduct periodic reviews to assess the degree of completion of technical and programmatic efforts. The contractor shall manage and track data and related correspondence and support interface/integration activities.

4.1 Integrated Cost, Schedule and Technical Performance Management. The contractor shall implement, document, and use an earned value based management system compliant with the contractor's earned value management system (EVMS) for integrated cost, schedule, and technical performance management. The contractor shall report EVMS information to the government using the cost performance report (CPR) "no criteria" approach. The contractor shall flow down earned value management and reporting requirements to major subcontracts that, based on risk, schedule criticality, and dollar value, have the potential to impede the successful completion of the program. The contractor shall relate technical accomplishments with cost and schedule in contract performance reports and at reviews. The contractor shall maintain the contract work breakdown structure (CWBS) and the CWBS dictionary.

4.2 Reviews. The contractor shall identify, conduct, and document reviews both formal and informal, to assess the degree of completion of technical and programmatic efforts related to major schedule milestones including, but not limited to design reviews, in-process reviews, and integrated baseline reviews. It is anticipated that formal technical reviews will be conducted quarterly. SSR may be conducted independently or in conjunction with an IPR. One copy of design review agenda and outline shall be submitted to the government for comments 30 days prior to the design review. The government will respond within 10 days of receipt of agenda and outline. One printed copy of material presented at reviews shall be provided to all review attendees. An electronic copy of all presentation materials shall be provided to each government and government support contractor represented. The contractor shall conduct a program review process to ensure complete insight into the program by the government. This review process shall include monthly informal cost, schedule, performance, and affordability status reviews and via e-mail weekly program status reports. The contractor shall identify milestones necessary for coordination of key elements and interfaces to accomplish an orderly, event-driven program. Action items identified at reviews shall be documented, distributed, and tracked through an electronic database accessible by the government.

4.3 Data Management. The contractor shall manage the preparation, submittal, maintenance, and tracking of data and related correspondence to include the maintenance and submittal of a Data Accession List (DAL). The contractor shall develop and maintain the DAL in contractor format to provide a single objective repository of contractor and subcontractor analytic and technical information. It shall document evolution of KV and CV component and subsystem designs, traceability of performance requirements and their allocation to hardware and software configuration items, design margin assessments, component and subsystem test results, and integrated MKV system test results. The DAL shall reflect the current state of the MKV system design and be revised as the design matures. To facilitate data management, the contractor shall maintain requirements, engineering, logistics, and program data including a program management plan (PMP) and an integrated master schedule (IMS)] in an electronic database accessible by the government.

4.4 Interface/Integration Activities. The contractor shall provide technical support to the Government in executing the MKV program. The contractor shall participate in technical interchange meetings and program management meetings as necessary.

4.5 Quality Assurance (QA). The contractor shall implement a quality assurance plan, IAW ISO 9001 and ISO 9000-3. The QA Plans specified by these requirements shall be included in the Data Accession List. The contractor's quality program shall ensure that all inspections/tests required by the contract requirements are contained in the contractor's production planning and manufacturing methods and are being performed and these same requirements must be flowed down to subcontractors and suppliers to ensure overall compliance to the contract.

4.6 Product Assurance (PA). The contractor shall plan and conduct a PA program that integrates PA requirements into the design, manufacture, and test of all MKV system hardware and software. The contractor's PA program shall be based on best practices to establish the necessary PA processes, controls, and approval authority to ensure that product quality, reliability, safety, and other system attributes are not compromised. Audits and analyses shall be conducted to ensure the major subcontractors and vendors are compliant with the PA program.

5.0 System Engineering. The contractor shall perform system engineering and specialty engineering to (1) define and allocate MKV system requirements and incorporate them into a design that derives and balances components, software, and simulation requirements; (2) ensure that design, development, test, data/data analysis; and performance demonstrations yield the results, documentation, and validated high fidelity simulation end products needed to satisfy the SOW. The contractor shall implement and maintain a PMP. The contractor shall maintain and provide to the government at specified intervals an IMS to manage all program activities described in the PMP.

5.1 Requirements. The contractor shall allocate requirements to the MKV design. This allocation shall be documented and maintained in the MKV System Specification and lower level specifications. As part of the requirements allocation process, the contractor shall conduct trade studies to assess affordability, producibility, and supportability by evaluating MKV performance requirements against projected or potential design, testing, manufacturing, maintenance, operations and support, and overall life cycle costs. The contractor shall define the MKV design margin assessment process and the reporting process for margin against the allocated performance requirements in the PMP. The contractor shall include requirements verification and validation plans for the integrated MKV system and major components, subsystems, ground support equipment, and interfaces to other test system elements in the PMP. The contractor shall provide the plans and processes for coupling requirements validation with design/critical issue resolution by integrating analysis, simulation, ground test, and flight test data. The PMP shall provide a risk assessment, mitigation, and management approach. The IMS shall establish the traceability from the PMP to the design, development, fabrication, integration, and test and evaluation planning to meet performance requirements.

5.2 Mission Planning and Test Requirements. The contractor shall plan a comprehensive and cost effective test program for the ground and flight tests. The contractor's test program shall consist of a logical sequence of ground and flight tests to validate and document performance of KV and CV components and the integrated MKV system as documented in the MKV System Specification and lower level specifications. The contractor shall ensure balance in the planning, development, and conduct of the test effort to meet system performance and safety requirements. The contractor shall define and document the ground and flight test objectives in the PMP. The contractor shall maintain the master test plan.

5.3 Ground and Flight Test Planning. Ground and flight test planning shall include development of test schedules, master test planning per the PMP and IMS, and detailed test specifications/plans and procedures. The contractor shall maintain or develop as required as part of the test plan(s), a set of criteria by which the performance of components, subsystems, and integrated systems will be measured. Schedule risk mitigation techniques shall be employed. The contractor shall plan for test data acquisition, handling, and analysis.

5.4 Configuration Management. The contractor shall maintain a configuration management program to ensure control of the documentation, hardware and software that will be used in the program. A Configuration Management Plan (CMP) shall be updated as required. The contractor's CMP shall describe the processes, methods, and procedures to be used to manage the functional and physical characteristics of the assigned configuration items (CI) under the program. The contractor shall implement a configuration control function that ensures regulation of the flow of proposed changes, documentation of the complete impact of the proposed changes, and release only of approved configuration changes into CI's and their related configuration documentation. The contractor shall also implement a configuration identification process to incrementally establish and maintain a definitive basis for control and status accounting for each CI throughout the program cycle. The KV and CV designs shall be controlled IAW the approved CMP not later than immediately following their respective CDRs.

6.0 Specialty Engineering. The contractor shall conduct specialty engineering efforts to execute the MKV program. Processes, methods, and procedures utilized to implement these specialty engineering activities shall be identified and defined in the PMP and IMS. Status of these efforts shall be discussed during program reviews.

6.1 Environmental, Safety, and Health. The contractor shall implement practices and initiatives throughout the life of the program to ensure that all program activities are environmentally compliant, that both system safety and health requirements are met, hazardous materials are minimized and controlled and that pollution prevention measures are observed. The ESH considerations to be addressed during design, fabrication, integration, testing and fielding shall address the following:

6.1.1 Environmental Protection. The contractor shall assist the Government's assessments required by the National Environmental Policy Act (NEPA) (42 USC 4321-

4370d) implementing regulation 40 CFR 1500-1508 and 32 CFR Part 651. If necessary, the contractor shall provide a description of proposed contractor actions along with qualitative and quantitative data describing the constituent materials, emissions, effluents, wastes, and hazardous materials used in and produced from these activities.

6.1.2 Hazardous Material Management. The contractor shall not use, or require the use of substances listed in Emergency Planning and Community Right-to-Know Act (EPCRA) Section 313 “toxic chemicals” and EPCRA Section 302, “extremely hazardous substances” (available at: <http://www.epa.gov/ceppo/pubs/title3.pdf>) nor the use of substances identified in the EPA 17 list (available at: <http://www.epa.gov/opptintr/3350/33finb1.htm>) in the design, fabrication, integration, or test activities associated with the MKV program unless written approval is provided by the government via the engineering change process. The contractor shall not use any Class I Ozone Depleting Chemicals/Ozone Depleting Substances (ODC/ODS), listed at <http://www.epa.gov/ozone/ods.html>) in the manufacture of items required by this task order, unless a waiver is obtained from the government. The contractor shall minimize the use of other hazardous materials and Class II ODSs. The contractor shall provide immediate notification of any proposed hazardous material mitigation/elimination efforts that may adversely impact schedules, cost and/or performance. The contractor may use NAS411 as a guide for implementing a Hazardous Materials Management Program (HMMP). The HMMP will be prepared IAW DI-MISC-81398 and results of the HMMP shall be made available to the government IAW DI-MISC-81397.

The contractor shall prevent pollution to minimize program environmental and cost impacts and ensure that all pollutants whose generation cannot be prevented will be recycled or disposed of in an environmentally safe manner.

6.1.3 System Safety/Health: The contractor shall plan, develop and implement a System Safety/Health Program for the MKV IAW DI-SAFT-81626. The System Safety/Health Program shall be integrated with the concurrent engineering processes used to develop, mature and support the MKV System. The contractor shall use MIL-STD 882D, as tailored by AR 386-16 and AR 385-10, in determining whether System Safety/Health engineering objectives are met.

6.1.3.1. System Safety/Health Program Plan. The contractor shall develop a System Safety/Health Plan, that defines safety/health activities, relationships to other contractor organizations and the overall MKV Program.

6.1.3.2 Safety Hazard Analyses. The contractor shall develop and/or update System, Subsystem, Operating and Support and Software Safety (top level and detailed level) hazard analyses to address KV design or peculiar modifications IAW DI-SAFT-80101. Analyses shall identify design and procedural hazards of safety critical components and operations of the KV throughout its life cycle. The analysis efforts shall include a fault tree analysis of all catastrophic and critical events impacted by the KV design. A single hard copy of each final hazard analysis, complete with contractor’s signed signature page shall be delivered to the Government for approval, IAW DI-SAFT-80101. Existing KV

hazard analyses may be used to the fullest extent as applicable. The contractor shall institute a system for tracking hazards. This management control process should include the method to be used for determination of hazard resolution and safety compliance. Hazard resolution and safety compliance shall be demonstrated by evidence of implementing corrective actions to adequately control hazards. Data shall be made electronically available to the Government for residual risk acceptance

6.1.3.3. Eliminate or Reduce Hazards to Acceptable Levels. Hazards will be eliminated or reduced to an acceptable level through appropriate design and or materiel selection. Contractor shall use the following order of precedence to eliminate or control potential safety/health hazards.

a. Design for Minimum Risk – Unacceptable hazards and environmental conditions shall be eliminated or their associated risks mitigated by design when feasible.

b. Incorporate Safety Devices – Hazards or unacceptable environmental conditions that cannot be eliminated or controlled through design selection shall be controlled to an acceptable level of risk through the use of fixed, automatic or other protective safety design features or devices. Provision shall be made for periodic functional checks of safety devices.

c. Provide Warning Devices - Devices will be installed to detect hazardous or unacceptable environmental conditions that cannot be otherwise eliminated or controlled. Adequate warnings shall be provided to alert personnel of the hazard or unacceptable condition and afford sufficient time for personnel response.

d. Develop Procedure and Training – When all other reasonable possibilities of hazard resolution or environmental protection have been exhausted, procedural controls and specialized training may be used to counter hazardous or unacceptable environmental conditions and actions. Warning and inspections provisions and procedures will be used to detect and correct failures, malfunctions and, errors before the hazard or environmental damage manifests itself. In no case will a single warning or caution or other form of written advisory be the only form of risk reduction.

6.1.3.4 Insensitive Munition (IM). The MKV shall be designed to a Type V reaction in bullet and fragment impact, Fast Cook-Off and Slow Cook-Off tests and no Type I (detonation) reaction of acceptor in Sympathetic Detonation Test for final Government IM testing. The contractor shall make provisions within development plans to provide test assets in future task orders in the configuration specified in the government furnished IM test plan.

6.1.3.5 Explosives Hazard Classification. The contractor shall provide data for Interim Hazard Classification (IHC) IAW DI-SAFT-81299B.

6.1.3.6 Radioactive Material. No radioactive, carcinogenic, or highly toxic materials, as defined by 29 CFR (OSHA), current revision, shall be incorporated into the system without prior Government approval.

6.1.3.7 Contractor Facilities. All explosives and related dangerous material facilities and operations shall comply with DOD 4145.26-M for Privately Owned, Privately Operated (POPO) contractor facilities. If Government Owned, Contractor Operated (GOCO) facilities are used, the contractor shall comply with the providing service explosive standards.

6.1.3.8 Safety Tests. The contractor shall plan safety tests on all new or modified explosive items of the MKV system. The plans shall include drop tests (in packaged configuration) to verify (1) no functioning of any energetic portion of the KV and CV, (2) no rupture of the test item(s) which dislodges or disrupts explosives material, (3) the item is safe to handle and dispose of by normal EOD procedures and, (4) all safety devices remain in the safe condition. The contractor shall ensure safety test plans and strategies are compatible with GBI/EKV testbed and tactical system development safety requirements. An IM test program will be managed by the Government as described in paragraph 6.1.3.4. The contractor development plan shall include an asset (in packaged configuration) for the Government conducted test.

6.2 Operations Security. The contractor shall prepare an Operations Security (OPSEC) Plan or an Annex to a previously approved plan for the MKV program. The OPSEC Plan or Annex shall identify the perceived collection threat to the contractor's portion of the MKV program, essential elements of friendly information, identified vulnerabilities, and protective counter measures that the contractor will employ to protect relevant sensitive unclassified information.

6.3 Threat Intelligence Information. The contractor shall use government furnished threat definitions in all planning, analysis, and testing documents where intelligence and threat information is required. The contractor shall coordinate any additional requests for intelligence and threat materials through the contracting officer's representative (COR) to ensure that the most current Defense Intelligence Agency validated sources are used in planning, analysis, and testing documents. Threat positions or assessments developed by the contractor shall be submitted to the COR for approval and/or validation.

7.0 Facilities. The contractor shall perform analyses/studies required to define/modify existing facilities for ground testing. The contractor shall provide input for site surveys, environmental impact documentation, facilities planning, and preliminary facility design efforts if required.

8.0 Period of Performance: 1 November 2004 – 31 December 2005

9.0 Task Order Monitor

The Task Order Monitor for this effort is [REDACTED]