FINAL
LIFE CYCLE ENVIRONMENTAL ASSESSMENT (LCEA) FOR THE EXTENDED RANGE/MULTI-PURPOSE (ER/MP) UNMANNED AERIAL VEHICLE SYSTEM (UAVS)

Unmanned Aerial Vehicle Systems
Project Office

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LIFE-CYCLE ENVIRONMENTAL ASSESSMENT
FOR THE
EXTENDED RANGE/MULTI-PURPOSE (ER/MP)
UNMANNED AERIAL VEHICLE SYSTEM (UAVS)

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FINDING OF NO SIGNIFICANT IMPACT (FNSI)
FOR THE
LIFE CYCLE ENVIRONMENTAL ASSESSMENT (LCEA)
FOR THE
EXTENDED RANGE/MULTI-PURPOSE (ER/MP)
UNMANNED AERIAL VEHICLE SYSTEM (UAVS)

BACKGROUND: The Extended Range/Multi-Purpose (ER/MP) Unmanned Aerial Vehicle System (UAVS) is a weapons-capable UAV primarily used in Reconnaissance, Surveillance, and Target Acquisition (RSTA) Command, Control, Communications, Computers and Intelligence (C4I) roles in support of the Corps/Unit of Employment (UE) and below. The ER/MP UAVS will replace and upgrade the current Hunter UAV system, using the existing force structure and support concepts for the threshold system and perform tactical level RSTA and C4I, and provide a weapons capable platform throughout the full spectrum of Army operations including offensive, defensive, stability, and support operations as defined by FM 3-0, *Operations,* and Shaping, Decisive, and Transition Operations as defined by the Objective Force (OF) concept.

The ER/MP UAVS will operate in close proximity to heavily defended areas. It will be subject to hostile air defenses that may include the full range of anti-aircraft systems including conventional small arms, automatic anti-aircraft weapons, Man Portable Air Defense Systems (MANPADS), and crew-served systems using radar, optics, and electro-optics for detection, tracking, and engagement. The threat will also include launcher mounted Surface to Air Missiles (SAMs), air-to-air weapons launched by fixed wing aircraft, helicopters, and counter-UAV UAVs, anti-radiation missiles, and directed energy weapons. Airborne and ground components will be susceptible to the same threat as the unit they support. Airborne and ground computers, communications/data links (networks) may be subjected to offensive Information Operations (IO) (to include electronic warfare (EW)) and Computer Network Attack (CNA) and Computer Network Exploitation (CNE) and Signals Intelligence (SIGINT) exploitation.

DESCRIPTION OF THE PROPOSED ACTION: The Proposed Action is the continued management activities by the UAVS Project Office (UAVS PO) at Redstone Arsenal, Alabama, including: product development and improvement, testing, training, deployment, and ultimate demilitarization/disposal of the ER/MP UAVS.

ALTERNATIVES CONSIDERED: Two alternatives were considered during the scoping process: the No Action Alternative and the Preferred Alternative. The Preferred Alternative would result in production, testing and eventual fielding of the ER/MP UAVS.

ENVIRONMENTAL EFFECTS: The ER/MP UAVS is a weapon system still under development. Only minor impacts to air quality, hazardous materials and waste, health and safety, and noise would be expected to occur at facilities where the ER/MP UAVS would be produced, tested, and/or deployed. No significant impacts to the environment are anticipated from the ER/MP UAVS program.

CONCLUSION: A detailed review of available literature was conducted in the preparation of this document. Beneficial and/or adverse information on environmental impacts of the system

should be periodically reviewed and kept current during the remainder of the ER/MP UAVS life-cycle.

No cumulative impacts to the environment were identified and no mitigative measures are necessary for the ER/MP UAVS. This document concludes that there would be no significant environmental impacts associated with the continued acquisition, development, maintenance, and deployment of the ER/MP UAVS that would require the publication of an Environmental Impact Statement.

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ACRONYMS AND ABBREVIATIONS

A2C2S	Army Airspace Command and Control System
ABCS	Army Battle Command System
ACHP	Advisory Council on Historic Preservation
ACS	Aerial Common Sensor
ACTD	Advanced Concept Technology Demonstration
ADR	Air Data Relay
AED	Aviation Engineering Directorate
AFATDS	Advanced Field Artillery Target Data System
AGL	Above Ground Level
AI	Area of Interest
AMCOM	Army Aviation and Missile Command
AoA	Analysis of Alternatives
APE	Area of Potential Effect
AQS	Airworthiness Qualification Specification
ASAS	All Source Analysis System
ATEC	Army Test and Evaluation Command
AT&L	Acquisition Technology and Logistics
ATLS	Automatic Take-Off Landing System
AV	Air Vehicle
AVUM	Aviation Unit Maintenance
AWR	Airworthiness Releases
B-LRIP	Beyond-Low Rate Initial Production
BLOS	Beyond-Line-Of-Sight
C4I	Command, Control, Communications, Computers, and Intelligence
C4ISR	Command, Control, Communications, Computers, and Intelligence, Surveillance and Reconnaissance
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CDD	Capabilities Development Document
CDR	Critical Design Review
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CFSR	Contractor Field Support Representative
CGS	Common Ground Stations
CMSM	Contractor Managed Supply and Support
CNA	Computer Network Attack
CNE	Computer Network Exploitation
COMSEC	Communications Security
CONOPS	Concept of Operations
CONUS	Continental United States
COTS	Commercial-Off-The-Shelf
CPD	Capabilities Production Document

CWA	Clean Water Act
DCGS-A	Distributed Common Ground System-Army
DII/COE	Defense Information Infrastructure /Common Operating Environment
DL	Data Links
DoD	Department of Defense
DoDI	Department of Defense Instruction
DOT	Department of Transportation
D/OT&E	Director/Operational Test & Evaluation
DRR	Design Readiness Review
DT	Developmental Testing
DT&E	Developmental Test and Evaluation
DTC	Developmental Test Command
DTSS	Digital Topographic Support System
EA	Electronic Attack
EDT	Engineering Developmental Testing
EIS	Environmental Impact Statement
EMP	Electro-Magnetic Pulse
ENMP	Environmental Noise Management Program
EO	Executive Order
EO/IR	Electro-Optical/Infrared
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-To-Know Act
ER/MP	Extended Range/Multi-Purpose
ESA	Endangered Species Act
ESH	Environmental Safety and Health
EW	Electronic Warfare
FAA	Federal Aviation Administration
FAADS	Forward Area Air Defense System
FCS	Future Combat System
FNSI	Finding of No Significant Impact
FOC	Full Operational Capability
FRP	Full Rate Production
FY	Fiscal Year
GCS	Ground Control System
GDT	Ground Data Terminal
GFE	Government Furnished Equipment
GFP	Government Furnished Property
GOTS	Government Off-The-Shelf
GPS	Global Positioning System
GSE	Ground Support Equipment
HAPs	Hazardous Air Pollutants
HEMP	High-altitude Electro-Magnetic Pulse
HFE	Human Factors Engineering
HHAs	Health Hazard Assessments

HMMP	Hazardous Materials Management Plan
HSI	Human Systems Integration
HTI	Horizontal Technology Insertion
I/O	Input/Output
ICAO	International Civil Aviation Organization
ICD	Initial Capabilities Document
ICDs	Interface Control Documents
IERs	Information Exchange Requirements
ILS	Integrated Logistics Support
IMDG	International Maritime Dangerous Goods
IMETS	Integrated Meteorological System
IO	Information Operations
IOC	Initial Operational Capability
IOT	Initial Operational Test
IOT&E	Initial Operational Test and Evaluation
ISR	Intelligence, Surveillance and Reconnaissance
IT	Information Technology
JROC	Joint Requirements Oversight Council
JSTARS	Joint Surveillance Target Attack Radar System
JTA	Joint Technical Architecture
LCEA	Life-Cycle Environmental Assessment
LFT&E	Live Fire Test and Evaluation
LMI	Logistics Management Information
LOS	Line of Sight
LRF/LD	Laser Range Finder/Laser Designator
LRIP	Low Rate Initial Production
LRUs	Line Replaceable Units
LSA	Logistics Support Analysis
LUT	Limited User Test
M&S	Modeling and Simulation
MANPADS	Man Portable Air Defense Systems
MDA	Milestone Decision Authority
MDAP	Major Defense Acquisition Program
METT-TC	Mission, Enemy, Terrain, Troops, Time available, and Civilian considerations
MMI	Man-Machine Interface
MNS	Mission Need Statement
MOGAS	Motor Gasoline
MSE	Multiple Subscriber Equipment
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAS	National Aerospace Standard
NCES	Net-Centric Execution System
NDI	Non-Developmental Items

NEPA	National Environmental Policy Act
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NHPA	The National Historic Preservation Act
NLOS	Non-Line-Of-Sight
NSS	National Security Systems
OCONUS	Outside Continental United States
ODCs	Ozone-Depleting Chemicals
ODSs	Ozone-Depleting Substances
OF	Objective Force
OMS/MP	Operations Mode Summary/Mission Profile
OPTEMPO	Operational Tempo
ORD	Operational Requirements Document
OSHA	Occupational Safety and Health Administration
OT	Operational Test
OT&E	Operational Test and Evaluation
PDR	Preliminary Design Review
PGCS	Portable Ground Control Station
PGDT	Portable Ground Data Terminal
PM	Project/Product/Program Manager
PM_{10}	Particulate Matter (less than 10 μ in size)
$PM_{2.5}$	Particulate Matter (less than 2.5 μ in size)
PO	Project Office
PPT	Production Prove-Out Test
QDR	Quadrennial Defense Review
RCRA	Resource Conservation and Recovery Act
RDEC	Research, Development, and Engineering Center
REC	Record of Environmental Consideration
RF	Radio Frequency
RSTA	Reconnaissance, Surveillance, and Target Acquisition
SAMS	Surface to Air Missiles
SEMA	Special Electronic Mission Aircraft
RAM	Reliability, Availability, and Maintainability
RVT	Remote Video Terminal
SAR/MTI	Synthetic Aperture Radar/Moving Target Indicator
SARA	Superfund Amendments and Reauthorization Act
SATCOM	Satellite Communication
SCD	Systems Capabilities Demonstration
SDD	System Development and Demonstration
SDWA	Safe Drinking Water Act
SEMA	Special Electronic Mission Aircraft
SEMP	System Engineering Management Plan
SEP	System Evaluation Plan
SER	System Evaluation Report
SFR	System Functional Review

SIGINT	Signals Intelligence
SIPT	Supportability Integrated Product Team
SLPT	System Level Performance Test
SOPs	Standard Operating Procedures
SRR	System Requirements Review
SSMP	System Safety Management Plan
SSPP	System Safety Program Plan
SSWG	System Safety Working Group
SWB	Software Blocking
TAFT	Test-Analyze-Fix-Test
TAIS	Tactical Airspace Integration System
TAMMS	The Army Maintenance Management System
TCDL	Tactical Common Data Link
TD	Technology Development
TDS	Technology Development Strategy
TLE	Target Location Error
TOE	Table of Organization and Equipment
TRADOC	Training and Doctrine Command
TRI	Toxic Release Inventory
TRI-TAC	Tri-Service-Tactical
TRR	Test Readiness Review
TUAV	Tactical Unmanned Aerial Vehicle
UAV	Unmanned Aerial Vehicle
UAVS	Unmanned Aerial Vehicle System
UE	Unit of Employment
UN	United Nations
UPC	Unit Production Cost
UPS	Uninterruptible Power Supply
USD	Under Secretary of Defense
VOCs	Volatile Organic Compounds
WCP	Warfighter Information Network-Tactical Communications Payload
WIN-T	Warfighter Information Network-Tactical

1.0 INTRODUCTION

The Extended Range/Multi-Purpose Unmanned Aerial Vehicle System (ER/MP UAVS) is a weapons-capable Unmanned Aerial Vehicle (UAV) primarily used in Reconnaissance, Surveillance, and Target Acquisition (RSTA), Command, Control, Communications, Computers, and Intelligence (C4I) roles in support of the Corps/Unit of Employment (UE) and below. Combatant commanders have a need to provide Commanders a real-time responsive capability to conduct wide-area near real-time RSTA, Command and Control, Signals Intelligence (SIGINT), Electronic Warfare (EW), and special operations missions during peacetime and all levels of war against defended/denied areas over extended periods of time. The evolution of the hostile surface-to-air and air-to-air threat and their collective effectiveness against manned aircraft can generate unacceptably high attrition rates. Satellite systems are threatened by Electronic Attack (EA) and Computer Network Attack (CNA) to the overhead and downlink components, and EA, CNA, and physical attack against the ground component. Further, satellites are often too predictable; have insufficient dwell time over targets of operational/tactical interest; are not always responsive to the needs of tactical commanders; and, in some cases, cannot acquire the necessary data. Current systems cannot perform these missions in a timely, responsive manner in an integrated hostile air defense environment without high risk to personnel and costly systems. There is a need for a capability that can be employed in areas where enemy air defenses have not been adequately suppressed, in heavily defended areas, in open ocean environments, and in contaminated environments. Nuclear survivability is required as necessary to perform missions in a nuclear contaminated environment, including operating in the presence of High-altitude Electro-Magnetic Pulse (HEMP) (Objective).

This Life-Cycle Environmental Assessment (LCEA) evaluates the potential environmental impacts, which may result from the continued management, product development and improvement, testing, training, deployment, and ultimate demilitarization/disposal of the ER/MP UAVS. This document has been developed through the review of available environmental documentation, but does not address specific environmental impacts at production, testing, training, deployment and operational locations. These specific impacts would be addressed by environmental documents prepared by the installation where those activities occur. Contractor facilities for the production of the ER/MP UAVS components would be expected to adhere to all Federal, state, and local regulations regarding environmental issues to include: health and safety, pollution prevention, hazardous materials and hazardous waste management.

This LCEA was prepared in accordance with the requirements set forth by the National Environmental Policy Act (NEPA) (1969); Department of Defense (DoD) Directive 5000.1, *The Defense Acquisition System*, authorized October 23, 2000 and reissued May 12, 2003; DoD Instruction 5000.2, *Operation of the Defense Acquisition System*, authorized May 12, 2003; and 32 Code of Federal Regulations (CFR) Part 651, *Environmental Analysis of Army Actions, Final Rule*; dated March 29, 2002.

1.1 Background

The U.S. Army UAVS Project Office (PO) is responsible for the oversight and management of the ER/MP UAVS. The ER/MP UAVS is designed to collectively fulfill the ER/MP UAVS Operational Requirements Document (ORD) approved by the Army Requirements Oversight Council on 16 December 2003. The requirement for the ER/MP UAVS was initially identified when the Chairman of the Joint Requirements Oversight Council (JROC) signed the Mission Need Statement for a Long Endurance RSTA capability on 5 January 1990 (JROC Memo. 003-90). The ORD is expected to be approved by the JROC by the first quarter of Fiscal Year (FY) 2005 (1QFY05).

Current and envisioned non-Army UAV systems are limited in their ability to provide responsive support to various requesting ground-maneuver units based on limited assets. This limitation is multiplied by the supporting units' lack of direct control and tasking authority over the UAV asset while enroute or over the target area. When units are successful in requesting UAV support, communications problems and delays in retasking procedures/authority decrease the effectiveness and responsiveness of the UAV system. While other non-Army UAV systems are 'stove-pipe' controlled by rear-positioned control stations, often beyond organic communications reach, the ER/MP UAVS will utilize the Ground Control Station (GCS) to eradicate this problem. The GCS, objectively as a Distributed Common Ground System-Army (DCGS-A) plug, will enable the UAVS commander to 'hand-off' control of organic UAVs to non-organic, echelon-irrelevant (objectively service-irrelevant) units using common control architectures and procedures, thus effectively creating a network of UAV control stations deployed, as needed, throughout the battlespace. This capability will put the UAV system's 'cockpit' and direct tasking authority into the hand's of the supported commander thereby providing flexible UAV support and allowing the forward commander to 'fight' the UAV asset instead of only receiving products from it. The ER/MP UAVS combined with the GCS will provide more relevant, timely and responsive asset while avoiding inadequacies inherent in current non-Army systems.

Currently no other service can supply this capability. The lack of such capability limits commanders' flexibility in providing UAVs to collect important intelligence information, to conduct responsive RSTA, Command and Control, EW, and special operations missions.

1.2 System Overview

The Increment I ER/MP UAVS will consist of five GCS, five Tactical Common Data Link (TCDL) Ground Data Terminals (GDTs), two Portable Ground Control Station (PGCS), two TCDL Portable Ground Data Terminals (PGDTs), twelve Aerial Vehicles (AVs) each equipped with multi-mission payloads, a standard equipment package, and associated ground support equipment. Six of the twelve Air Vehicles (AVs) will be equipped with Satellite Communication (SATCOM) systems, and one ground SATCOM system will be provided. Each AV will have the connectivity capability, and space, weight and power to support SATCOM and payloads. The ER/MP UAVS will be capable of simultaneously controlling three AVs, which will provide three continuous RSTA/Intelligence, Surveillance and Reconnaissance (ISR) missions, consisting of Electro-Optical/Infrared (EO/IR) and Synthetic Aperture Radar/Moving Target Indicator (SAR/MTI) imagery, or two RSTA/ISR missions and one Warfighter

Information Network-Tactical (WIN-T) Communications Payload (WCP) mission, as well as Air Data Relay (ADR) support for all RSTA missions. The Increment I system will, at a minimum, provide 24 hours of coverage from two launch and recovery sites.

The ER/MP UAVS will be capable of simultaneously carrying two modular mission payloads with a combined minimum payload weight of 200 pounds. Each AV will be weapons capable with internal wiring/cabling and will have a minimum of two hard points each capable of supporting a minimum of 200 pounds. The ER/MP UAVS will transmit data from the AV to the GCS/PGCS via the TCDL, a secure data link. The GCS will give ready interface to the C4I architecture, to include DCGS-A, Joint Surveillance Target Attack Radar System Common Ground Stations (JSTARS CGS), Advanced Field Artillery Target Data System (AFATDS), All Source Analysis System (ASAS), Forward Area Air Defense System (FAADS), and Army Airspace Command and Control System (A2C2S), Integrated Meteorological System (IMETS), Digital Topographic Support System (DTSS), and the Tactical Airspace Integration System (TAIS) when available. Integration with these external Army Battle Command System (ABCS) functional areas and other C4I systems will be phased appropriately taking into account both the ER/MP UAVS and external system development schedules and maturities coordinated with the Army Software Blocking (SWB) initiative.

The mission configured ER/MP UAVS must provide a time on station of 12 hours at an operational range of 300 km using Line of Sight (LOS)/ADR/SATCOM relay from the controlling station, flying at altitudes of 25,000 feet Mean Sea Level (MSL) or greater. Nominal operating altitudes/survivable altitudes are from 8,000 to 15,000 feet Above Ground Level (AGL) for day operations and between 6,000 to 10,000 feet AGL for night operations.

1.2.1 GROUND CONTROL STATION

The GCS is the command and control center. It is utilized for pre-flight, launch, hand-off and recovery for operation of AVs and payloads.

1.2.2 COMMUNICTIONS

Data Links (DL)

LOS DL for the AV and payload data and telemetry will be TCDL. Beyond-Line-Of-Sight (BLOS) Data Link will be from the GDT, through a single relay AV, to multiple mission AVs. The Non-Line-Of-Sight (NLOS) Data Link will be from the GDT through satellite communications to the mission AV. DL will extend to a minimum range of 300 km to an objective range of 500 km. The change to a SATCOM DL for AV control may necessitate a change in the GCS and GDT.

Table 1-1: Key Performance Parameters for the ER/MP UAVS

Key Performance Parameter	Development Threshold	Development Objective	ORD Ref
Multi Payload/Weight Capability			4.a.(2)(a)
AV capable of simultaneously carrying payloads with a combined minimum weight.	2 Payloads 200 lbs total	3 Payloads 300 lbs total	
Airframe Sensors Payload Capability	The UAVS will be capable of accepting payloads that are: (EO/IR/LRF/LD) capable of providing a 90% Probability of Detection (PD) and 90% Probability of Recognition (PR) of a standard target, from the AV's nominal operational altitude, out to a 4km standoff range (nadir to target) (SAR/GMTI Sensor) capable of providing 85% PD of a standard target, from the AV's nominal operational altitude, out to a 7.5km standoff range (nadir to target).	The UAVS will be capable of accepting payloads that are: (EO/IR/LRF/LD) capable of providing a 90% Probability of Detection (PD) and 90% Probability of Recognition (PR) of a standard target, from the AV's nominal operational altitude, out to a 8km standoff range (nadir to target) (SAR/GMTI Sensor) capable of providing 90% PD of a standard target, from the AV's nominal operational altitude, out to a 18km standoff range (nadir to target).	
Reliability			4.a.(5)(a)
System must maintain a combat operational availability (Ao).	≥80%	≥90%	
AV Propulsion			4.a.(2)(c)
Use certain fuels only.	MOGAS, AVGAS or JP-8.	Heavy Fuel Engine	
Joint Interoperability			4.b.(1)
Information Exchange Requirements	Critical IERs identified in attachments 1&2.	All IERs identified in attachments 1&2.	
Weapons Capable Airframe			4.a.(2)(t)
The AV must be weapons capable, to include internal wiring and a minimum of 2 hard points for supporting a minimum weight.	200 lbs each (400 lbs total)	500 lbs each (1000 lbs total)	

Ground Data Terminals (GDTs)

The GDT enables the DL to be sent between the GCS and the AV. It is composed of transceivers and controls a Differential Global Positioning System (GPS) Base Station (with position self-determination), fiber optic link for remote operations of up to 400 meters, and directional antenna system for the primary command/telemetry and video links. The GDT is generator powered.

Portable Ground Control Station (PGCS)

The PGCS can perform preflight/take-off/launch/recovery operations. It mirrors the monitoring, control or mission planning function of the full GCS.

Portable Ground Data Terminal (PGDT)

The PGDT provides the data link for the PGCS. The major components are common to the GDT (transceivers/receivers, etc.). The PGDT will have a range of at least 100 Km. The PGDT is generator powered.

1.2.3 PAYLOADS

Support of the RSTA mission will require sufficient AVs to allow three continuous RSTA missions. In addition, due to possible route and terrain restrictions, the mission will require sufficient AVs to allow two dedicated relay AVs. All payloads will be Government Furnished Equipment (GFE).

The EO/IR with Laser Range Finder/Laser Designator (LRF/LD) sensor will provide a day/night capability to display continuous imagery to battlefield commanders.

Synthetic Aperture RADAR/Moving Target Indicator (SAR/MTI) (Threshold Payload)

The SAR/MTI payload will provide the commander an all-weather, multi-mode, multi-functional radar to increase situational awareness, battle management and targeting by providing high resolution imagery in all types of weather. It will cue the commander of imminent threat activities that can be confirmed with other onboard sensors. On-board sensor cross cueing and auto-search are required as defined in the applicable payload tabs.

WCP (Threshold Payload)

Support of the Communication Relay mission will require sufficient AVs to allow one dedicated continuous WCP mission. To perform the Communications Relay mission the air platform will provide an airborne, multi-purpose, BLOS, relay. It will provide an airborne augmentation to organic ground VHF/UHF-type BLOS retransmission capability. Support of the WCP mission will require 24-hours of LOS/NLOS/BLOS coverage in a 24-hour period.

Signals Intelligence (SIGINT)(Objective Payload)

To perform the SIGINT mission the system may require the air platforms to utilize SIGINT mission payloads that will work in tandem to provide emitter mapping and location capability. This is envisioned to require the simultaneous use of two AVs with separate controlling stations to provide two simultaneous eight-hour sorties of LOS/NLOS/BLOS coverage in 24-hours with surge to 24-hours of LOS/NLOS/BLOS coverage in 24-hours.

Multi-Functional (Objective Payload)

To perform the multi-functional mission the air platform will utilize various mission payload packages that will provide mine, chemical and biological detection and support the commanders' force protection mission sets. Support of the multi-functional mission will require 8-hours of LOS/NLOS/BLOS coverage in 24-hours.

Additional Mission Sets (Objective Payload)

As doctrinal and operational concept developments evolve, there will be additional mission payloads that will be added to the air platforms capabilities. This requires that the air platform and mission payloads be modular in design providing for growth and updating. Currently, the air platform may be designed to conduct lethal/non-lethal, air-to-air and air to ground missions.

1.2.4 AIR VEHICLE (AV)

The AV is the airborne platform of the ER/MP UAVS. The AV serves as the "carrying device" for mission payloads. The GCS through the GDT remotely controls this system. The AV will have on-station time of 12 hours at a 300 Km range (objective is 24 hours at 500 Km) with airborne mission equipment included. The AV will have autonomous navigation capability and flight between multiple selected waypoints. Waypoints can be updated or reprogrammed from the controlling GCS.

1.2.5 RECOVERY EQUIPMENT

Automatic Take-Off/Landing System (ATLS)

The ATLS is the additional hardware and software required to facilitate automatic take-off and recovery of the AV in all possible configurations (i.e. equipped with the SEP and with/without payloads, weapons including asymmetric loads and optional equipment; with the full continuum of fuel loads). The ATLS design may be airborne only, ground only or a combination of equipment installed on each AV and ground equipment that interfaces with the GCS. If airborne equipment is required then each AV will include this equipment as part of the SEP. If ground equipment is required then four sets will be provided with each ER/MP system.

2.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

2.1 Description of the Proposed Action

The ER/MP UAVS is designed to replace the aging and technologically obsolete Hunter UAVS. It will expand upon proven technology and Tactics, Techniques and Procedures while leveraging current and advanced Commercial-Off-The-Shelf (COTS) technology to update the Corps/UE RSTA capabilities. Given the nature of the anticipated missions for Joint Forces and for the Corps/UE-size elements under Army Transformation, and the guidance provided by Objective Force (OF) 2015 White Paper, dated 14 Oct 2002, the requirement for an ER/MP UAVS is critical. The ER/MP UAVS will help form the foundation of advanced capabilities and core technologies needed for the Future Force as well as set the conditions for irreversible momentum as the Army transitions. The ER/MP UAVS teamed, or supported by other systems, will provide the Future Joint Force the best combination of long-range acquisition and targeting technologies. Mission duration, payload limitations, required connectivity, LOS limitations and related AV range limitations render current UAVs, and the Future Combat System (FCS) UAVS unacceptable for Corps/UE missions. The ER/MP UAVS will have the range and endurance to support shaping operations and to facilitate support to decisive operations missions and will be compatible with Army, Coalition, and Joint aircraft and systems in shaping the battlespace.

The applications envisioned for the ER/MP UAVS at the Corps/UE (long range RSTA, communications relay (voice and data), and objectively logistics delivery, SIGINT, future lethal and non-lethal attack, etc), combined with the obvious requirement for better dissemination to all services, require greater capabilities than are available with other Army UAVS. Longer dwell times, greater range requirements and a larger payload capacity and external store requirements are all necessary to support the Joint Force/Corps/UE UAVS applications. The greater data-link range requirement forces a higher service ceiling and as well as a NLOS solution when terrain or other obstacles do not permit LOS operations. The ER/MP UAVS will have a personnel and equipment footprint on the battlefield that is compatible with current and Future Forces - smaller is better. The ER/MP UAVS will also be compatible with the GCS (via TCDL when available), in keeping with the one system concept and to reduce system costs. ER/MP UAVS requirements are defined through a series of experiments and analytical efforts that range from the Training and Doctrine Command (TRADOC) funded Concept Experimentation Programs to Advanced Concepts Technology Demonstrations (ACTD). As a minimum, the ER/MP UAVS requirements will include the same types of applications as current Divisions-level UAV assets, but at even greater ranges. .

The base ER/MP UAVS will be weapons capable. The system will be capable of simultaneously controlling three mission AVs, which will provide three continuous RSTA/ISR missions, consisting of EO/IR and SAR/MTI imagery, or two RSTA/ISR missions and one WCP mission, as the commander sees fit. The initial missions equate to either 72-hours of RSTA/ISR coverage and 24-48 hours of ADR support, or 48-hours of RSTA/ISR coverage and 24-hours of WCP and 24-48 hours of ADR support all with a weapons capable platform. The Increment II system will

be capable of simultaneously controlling seven AVs that will provide 96-hours of RSTA coverage, 48-hours of ADR support, and 24-hours of WCP support, at a maximum depth of 300 km in a 24-hour period. The Increment I, and following Increments, will provide a unique unmanned weapons capable platform with objective attack and logistics delivery capability never before seen at a Corps/UE level. It is envisioned the Increment II system will consist of eight GCSs, eight GDTs, 4 PGCSs, 4 PGDTs, and an approximately 18-19 AVs. The ER/MP UAVS will provide the UE commander with a minimum of four dedicated RSTA missions, two dedicated ADR missions and one dedicated communication relay mission in a 24-hour period, with the flexibility to allow the combatant commander to tailor the mission support as the battle or mission dictates, i.e. four RSTA missions, two attack missions, zero ADR missions, one communication relay mission. In summation, the ER/MP UAVS will provide more coverage with a single baseline than legacy systems could with five. In addition, the ER/MP UAVS will provide more varied missions over a longer range with a smaller footprint and less logistical strain than legacy systems. It is anticipated that the system will be flexible enough to meet the ever-changing needs of the Corps/UE commander. Thus, the commander can 'design' the unit, to include the amount of equipment he wishes to dedicate to a specific battle or phase of the battle. This includes Early Entry, shaping and decisive actions, and transition operations. (U.S. Army Aviation Center, undated)

2.2 Need for the Proposed Action

The Quadrennial Defense Review (QDR) sets a transformation goal of denying enemy sanctuary by providing persistent surveillance, tracking, and rapid engagement. This will require a greater UAV capability than the Army has ever had before. Historically, Corps and Division-level UAV assets provided a maximum of 16 hours of RSTA coverage, consisting of EO/IR imagery only, in a 24-hour period, per baseline. The force structure required two baselines at Corps with an additional baseline at each subordinate Division. A single baseline consisted of three GCSs, two GDTs, one PGCS, one PGDT, and eight AVs. The battlefield effect for a Corp element, equipped with two baselines and three subordinate Division elements, each equipped with one baseline, was 80 hours of RSTA coverage (EO/IR only), to a maximum depth of 200km, in a 24-hour period. This required a total of 15 GCSs, 10 GDTs, 5 PGCS/PGDT (equivalent) and 40 AVs. The Future Force will be required to provide greater coverage, at greater ranges, with less footprint and logistics tail. It is envisioned that the Increment I system will consist of no more than twelve AVs, five control shelters, five ground data terminals, two portable control stations and data terminals.

Combatant commanders have a need to provide a real-time responsive capability to conduct wide-area near real-time RSTA, Command and Control, SIGINT, EW, and special operations missions during peacetime and all levels of war against defended/denied areas over extended periods of time. The evolution of the hostile surface-to-air and air-to-air threat and their collective effectiveness against manned aircraft can generate unacceptably high attrition rates. Current systems cannot perform these missions in a timely, responsive manner in an integrated hostile air defense environment without high risk to personnel and costly systems. There is a need for a capability that can be employed in areas where enemy air defenses have not been adequately suppressed, in heavily defended areas, in open ocean environments, and in contaminated environments. Nuclear survivability is required as necessary to perform missions

in a nuclear contaminated environment, including operating in the presence of high-altitude Electro-Magnetic Pulse (EMP) (objective). Currently no other service can supply this capability. The lack of such capability limits commanders' flexibility in providing UAVs to collect important intelligence information, to conduct responsive RSTA, Command and Control, EW, and special operations missions. (U.S. Army Aviation Center, undated) Consequently, the Chairman of JROC signed the Mission Need Statement (MNS) for a Long Endurance RSTA capability on 5 January 1990 (JROC Memo. 003-90).

A brief example of unique evolving Army requirements is listed below:

- **Manned-unmanned teaming with Army Aviation assets**. This entails the ability to hand off Level III and IV control of the ER/MP UAVS to other Army systems thereby creating an unequaled synergy on the battlefield. In addition, this eliminates sensor-to-shooter delays when the UAV is teamed with a manned armed asset.

- **Communications Relay**. Dedicated communications on the battlefield is critical, especially during Early Entry Operations. In support of the War Fighter Information Network-Tactical, the ER/MP will provide a continuous, dedicated 24-hour communications relay capability. This capability will be the primary airborne network relay during Early Entry Operations providing vital communications between command centers and forward deployed units. In addition, the ER/MP UAVS will provide a continuing 24-hour dedicated network augmenting capability once other network supporting systems are operational in theater.

- **Interoperability with the GCS**. This capability enables the ER/MP UAVS to be handed off to other Army non-ER/MP UAVS unit organic control stations or forward deployed ER/MP UAVS control stations. This greatly enhances the flexibility of the system and enables the commander to forward deploy a network of control stations allowing better coverage of the Corps/UE Area of Interest (AI) as well as provide direct support to subordinate units without dedicating ER/MP specific ground control stations.

2.3 Purpose of the Proposed Action

The ER/MP UAVS is essential toward fulfilling the anticipated missions for UE sized elements under the Army Transformation, and the guidance provided by Objective Force 2015 White Paper, dated 8 December 2002. Intended as a follow-on replacement to Hunter, this new capability will address in particular the UE needs of persistent stare, communications relay, and wide-area surveillance. The Hunter system, even though performing well as the UAV workhorse for the Army, has quickly become technologically obsolete. As a result, growing maintainability costs have driven the life-cycle cost of the system beyond what is affordable. The ER/MP UAVS is designed to provide enhanced support to the current force battlefield commander while enabling growth potential through evolutionary development. The system will serve as a Joint enabler using a variety of common interfaces to ensure networking and cross-service mission execution as well as vital dissemination of the system's products.

The ER/MP UAVS is critical to the foundation of advanced capabilities and core technologies needed for the Future Force and the conditions for irreversible momentum as the Army

transitions. The ER/MP UAVS teamed, or supported by other systems, will provide the Future Force the best combination of long-range acquisition and targeting technologies. The ER/MP UAVS will have the range and endurance to support shaping operations, and to facilitate support to decisive operations missions, and be compatible with Army, Coalition, and Joint aircraft in shaping the battlespace.

The ER/MP UAVS will be used to counter the general threat to its supported unit by providing real-time combat information/intelligence. It will operate in close proximity to heavily defended areas. It will be subject to hostile air defenses that may include the full range of antiaircraft systems including conventional small arms, automatic antiaircraft weapons, Man Portable Air Defenses (MANPADs), and crew-served systems using radar, optics, and electro-optics for detection, tracking, and engagement. The threat will also include shoulder fired Surface to Air Missiles (SAMs), launcher mounted SAMs, air-to-air weapons launched by fixed wing aircraft, helicopters, and counter-UAV UAVs, anti-radiation missiles, and directed energy weapons. Airborne and ground components will be susceptible to the same threat as the unit they support. Airborne and ground computers, communications/data links (networks) may be subjected to enemy EW and SIGINT exploitation and attack as well as CNA. (UAVS, 2002)

A number of new/future applications are being developed for the ER/MP UAVS, including employment as an armed and/or logistics delivery platform, Nuclear/Biological/Chemical detection and mine detection. These are likely to have a significant impact on the ultimate system requirements for this system. The ER/MP UAVS will also provide support to the Army's current corps level Special Electronic Mission Aircraft (SEMA) such as the future Aerial Common Sensor (ACS) system. Armed UAVs could be employed in support of a range of missions including working in conjunction with attack helicopters during Mobile Strike operations and attacking fleeting high value targets.

2.4 Existing Capabilities and Deficiencies

The ER/MP UAVS will replace and upgrade the current Hunter UAVS, using the existing force structure and support concepts for the threshold system and perform tactical level RSTA, C4I and provide a weapons capable platform throughout the full spectrum of Army operations including offensive, defensive, stability, and support operations as defined by FM 3-0, and Shaping, Decisive, and Transition Operations as defined by the OF concept. As part of the Army's migration to the vision of a highly flexible, responsive, and lethal future force, it is developing a UAV strategy to provide integrated, flexible, responsive, echelon-organic UAV support to Army commanders at all echelons for future forces, while not ignoring current force needs.

The Army has no other near or mid-term plan for a UAVS that would meet the stated requirements. The need to replace the aging Hunter fleet, thereby saving the maintainability cost and updating the current 1980's technology are critical to the Army. Historically, the Army has been able to draw limited support from Theater Assets due to the low density, high demand nature of those assets. Even when providing coverage with Corps-organic Hunter systems and only requesting vital support from theater assets, there were still gaps in support. This issue was

reiterated by the Air Force Air Combat Command UAV Integration White Paper, dated 13 April 2004, which states "the Air Force has been unable to service every request in the past due to limited assets". In addition, operations in OF and various exercises such as Roving Sands and ULCHI FOCUS LENS, have proven there was a critical shortage of Theater assets when tasked to directly support ground maneuver units. Considering the already strained Theater ISR support architecture and the need to replace the current Army Hunter UAV system combined with the Army's unique evolving requirements, GCS interoperability, operating environment and specific missions, other service's assets become both inefficient and less responsive to the ground maneuver commander.

Given the nature of the anticipated UE roles under Army Transformation, the requirement for an ER/MP UAV is vital. The possible mission sets and roles currently envisioned for the ER/MP UAVS (long range RSTA/ISR, dedicated communications relay, aviation Manned/Unmanned teaming and objectively SIGINT, attack, logistics delivery, etc.) all require greater capabilities than are available with other Army UAVS. Longer dwell times, greater range requirements, and a larger payload and external store capacity all are necessary to support these missions. The greater range requirement forces a NLOS capability as demonstrated during Operation ALLIED FORCE and ongoing operations in both Afghanistan and Iraq. It is entirely probable that additional missions will be identified as the Objective Force Concept becomes better defined.

3.0 ALTERNATIVES CONSIDERED

NEPA requires decision makers to consider all reasonable alternatives, including the No Action alternative, for proposed Federal actions such as the development, fielding and ultimate disposal of weapon systems. The preferred alternative is the alternative that the UAVS PO believes would fulfill its statutory mission and responsibilities, while giving consideration to economic, environmental, technical and other factors (40 CFR 1500-1508). The Preferred Alternative incorporates some elements of each of the considered alternatives. However, the Preferred Alternative is the only alternative considered a viable, stand-alone option. This section reviews the range of alternatives considered and specifies the Preferred Alternative.

3.1 Purchase and Modification of Existing Military/Commercial items

Product developers and decision-makers consider the purchase of existing military/commercial items where practical. Previous experience with UAVs has shown that there are Non-Developmental Items (NDI) and commercial items that can be utilized in the assembly and integration of the system at the major component and subcomponent level. The Acquisition Strategy for ER/MP UAVS emphasizes the use of these commercial items where suitable.

However, the Army's existing tactical communications network and Command, Control, Communications, Computers, and Intelligence, Surveillance and Reconnaissance (C4ISR) capabilities are not capable of supporting the Future Force warfighters' needs as configured. The forces' current tactical communications system served well to support yesterday's command, control, and support services that relied heavily on voice and short text messaging. Today's warfighter depends on a much broader spectrum of information services: video/multimedia, graphics data, imagery, collaborative planning tools, embedded training in a synthetic environment, and distributed data bases. Tomorrow's warfighter requires an offensively oriented network enabling battle command on the move, Information Dissemination capabilities, extended reach and reachback, and increased throughput. Information Exchange Requirements (IERs) generated by the Army's Future Force and rapidly changing warfighting doctrine and tactics exceed the capability and potential of the current tactical communications infrastructure. These developments demand an increase in communications capacity as well as great advances in information security, mobility, efficiency, and seamless integration. The existing C4ISR and communications architecture does not enable sensor fusion. Sensors must be part of the network; the routing of sensor information is critical to the "Decision Action Cycle". The Future Force C4ISR architecture must support "act on cues" as opposed to "reacting" from sensor information. Many information, automation, and communication lessons were learned in the 1990's from experiences such as Desert Storm (Iraq), Operation Joint Forge (Bosnia-Herzegovina), Joint Guardian (Kosovo) and the Army Warfighting Experiments. Operational concepts have changed significantly and warfighter expectations for mobility and offensive orientation have outgrown the scope of Multiple Subscriber Equipment (MSE) and Tri-Service-Tactical (TRI-TAC) service. The current tactical networks cannot be effectively or efficiently modified to satisfy these operational requirements. (UAVS, 2004a)

As a design goal, COTS and Government Off-the-Shelf (GOTS) hardware/software will be used throughout the ER/MP UAVS program wherever possible to mitigate risk. Use of Defense Information Infrastructure /Common Operating Environment (DII/COE) GOTS including time-phased evolution to the Net-Centric Execution System (NCES) products will enable the rapid enhancement of the ER/MP C4I software components in addition to providing an operating environment that enables the leveraging of additional GOTS products (Falconview, CJMTK, Common Operating Picture, Common Tactical Picture). (PEO Aviation, 2004)

3.2 New Development Program (Preferred Alternative)

The Preferred Alternative is to implement the Proposed Action. This alternative would continue acquisition activities and eventually produce and field the ER/MP UAVS for use by various military components.

3.3 No-Action Alternative

The No-Action Alternative would result in discontinuing the ER/MP UAVS program. The Army has no other near or mid term plan for a UAV system that would meet the requirements detailed in this document. The need to replace the aging Hunter fleet, thereby saving the maintainability cost and updating the current 1980's technology are critical to the Army. Therefore, the No-Action Alternative is not considered a viable alternative.

4.0 ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

This chapter discusses the various environmental components analyzed as well as the potential environmental impacts associated with the life-cycle phases of the ER/MP UAVS. Site-specific NEPA documentation is required for manufacturing, testing, and fielding activities as this document does not address potential impacts at specific locations (e.g., Ft. Huachuca, AZ). This section was prepared in accordance with the NEPA and DoD Directive 5000.1, *The Defense Acquisition System*, authorized October 23, 2000 and reissued May 12, 2003; DoD Instruction 5000.2, *Operation of the Defense Acquisition System*, authorized May 12, 2003; and 32 CFR Part 651, *Environmental Analysis of Army Actions, Final Rule*; dated March 29, 2002.

Eleven environmental components were analyzed to determine potential impacts to the environment from the Proposed Action. The environmental components addressed are air quality, biological resources, cultural resources, hazardous materials and waste, health and safety, infrastructure and transportation, land use, noise, geology and soils, socioeconomics, and water resources. The amount of detail presented in each section is proportional to the potential for impacts from the Proposed Action.

4.1 Related Environmental Documentation

Several documents have been prepared that provide information related to the potential environmental, safety, and health effects of the ER/MP UAVS. These include the following:

- *Life Cycle Environmental Impact Assessment for the Remotely Piloted Vehicle System* (October 1980)
- *Life Cycle Environmental Assessment (LCEA) for "DEEP" Unmanned Aerial Vehicle (UAV)* (20 January 1988)
- *Record of Environmental Consideration (REC) for Nonlethal UAV Short Range Tests (Multiple Locations)* (4 August 1989)
- *REC for RAVEN UAV* (November 1989)
- *REC for Customer Concept Test, "Air Defense Against UAV-Assessment of Target Location Capability"* (February 1989)
- *Environmental Assessment (EA) for Unmanned Aerial Vehicles at Fort Huachuca, Arizona* (August 1989)
- *LCEA for UAV Short Range Tests at Fort Huachuca Garrison Electronic Proving Ground* (February 1991)
- *Categorical Exclusion for UAV-Short Range Flight Tests at Naval Air Station, Point Mugu, CA* (June 1991)
- *LCEA for UAV Close Range* (November 1991)

- *EA for Short Range Unmanned Air Vehicle Tests at Fort Huachuca* (February 1992)
- *EA for the Construction and Operation of an Applied Instructional Building (AIB) to Accommodate Joint Service Training of Unmanned Aerial Vehicles, Fort Huachuca, Arizona* (November 1992)
- *REC for Heavy Fuel Engine for UAV Short Range Vehicle* (April 1993)
- *Comprehensive UAV Environmental Assessment* (November 1993)
- *LCEA for Hunter Baseline System for Joint Tactical Unmanned Aerial Vehicle* (September 1994)
- *Final EA for the Redstone Arsenal Master Plan Implementation, Alabama* (December 1994)
- *LCEA for Tactical Unmanned Aerial Vehicle* (7 July 1999)
- *Final LCEA for the Shadow 200 Tactical Unmanned Aerial Vehicle* (January 2002)
- *Environmental Assessment for the Operations, Training, and Testing of Unmanned Aerial Vehicles at Redstone Arsenal, Alabama* (May 2004)

The environmental tests for ER/MP UAVS will be undertaken in natural and induced environments in which the system is expected and required to operate. The environmental verification efforts associated with the TUAV Shadow 200 and Hunter Systems will be applied to the new ER/MP UAVS to the maximum extent possible. However, if there are any documented environmental performance deficiencies, test criteria differences or configuration changes to the existing system's equipment, additional analyses or environmental testing may be required. Government Furnished Property (GFP), which has been previously analyzed, will require system integration testing only and is not subject to the full range of environmental tests.

4.2 Environmental Components

Air Quality

The Clean Air Act (CAA), which was last amended in 1990, requires the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The EPA Office of Air Quality Planning and Standards has set NAAQS for six principal pollutants, called "criteria" pollutants (Table 4-1). Criteria pollutants are emitted primarily from combustion sources, including aircraft engines. Non-criteria pollutants are all other air pollutants that are regulated and controlled by emission standards, or other health-risk-based criteria. Non-criteria pollutants may be emitted from many sources, such as solvents, paints, and engine maintenance activities.

The EPA delegates much of its authority to administer regulations to the states, which in turn, are responsible for developing State Implementation Plans for the maintenance of air quality. The EPA has ultimate authority to approve or disapprove these plans, based on their adherence to Federal statutes. Federal facilities where ER/MP UAVS activities take place are required to comply with the guidelines established by the CAA, other applicable Federal regulations, and state regulations that administer guidelines to protect air quality.

Table 4-1: National Ambient Air Quality Standards

Pollutant	Standard Value		Standard Type
Carbon Monoxide (CO)			
8-Hour Average	*9 ppm*	*(10 mg/m^3)*	*Primary*
1-Hour Average	*35 ppm*	*(40 mg/m^3)*	*Primary*
Nitrogen Dioxide (NO_2)			
Annual Arithmetic Mean	*0.053 ppm*	*(100 µg/m^3)*	*Primary & Secondary*
Ozone (O_3)			
1-Hour Average	*0.12 ppm*	*(235 µg/m^3)*	*Primary & Secondary*
8-Hour Average	*0.08 ppm*	*(157 µg/m^3)*	*Primary & Secondary*
Lead (Pb)			
Quarterly Average	*1.5 µg/m^3*		*Primary & Secondary*
Particulate <10 micrometers (PM_{10})			
Annual Arithmetic Mean	*50 µg/m^3*		*Primary & Secondary*
24-Hour Average	*150 µg/m^3*		*Primary & Secondary*
Particulate <2.5 micrometers ($PM_{2.5}$)			
Annual Arithmetic Mean	*15 µg/m^3*		*Primary & Secondary*
24-Hour Average	*65 µg/m^3*		*Primary & Secondary*
Sulfur Dioxide (SO_2)			
Annual Arithmetic Mean	*0.03 ppm*	*(80 µg/m^3)*	*Primary*
24-Hour Average	*0.14 ppm*	*(365 µg/m^3)*	*Primary*
3-Hour Average	*0.50 ppm*	*(1300 µg/m^3)*	*Secondary*

Note: The ozone 8-hour standard and the $PM_{2.5}$ standards are included for information only. A 1999 Federal court ruling blocked implementation of these standards, which EPA proposed in 1997. Units of measure for the standards are parts per million (ppm) by volume, milligrams per cubic meter of air (mg/m^3), and micrograms per cubic meter of air (µg/m^3). Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

An air emissions analysis has not been performed on the ER/MP UAVS as of the writing of this LCEA. However, the ER/MP UAVS would not be anticipated to produce large quantities of criteria pollutants. Construction activities associated with the development and maintenance of test areas may generate particulate emissions during site clearing and grading activities, but as mentioned previously, these activities would be considered under site-specific NEPA documentation. Vehicle emissions during testing and construction activities would result in minor outputs of CO, nitrogen oxides (NOx) including NO_2, and Volatile Organic Compounds (VOCs). VOCs and NOx combine in the presence of sunlight to produce O_3. Operations can also affect air quality through oil and fuel releases from support vehicles.

The CAA requires the EPA to adopt National Emissions Standards for Hazardous Air Pollutants (NESHAPS) that may adversely affect public health or the environment. Much like the NAAQS, NESHAPS compliance is regulated through Standard Operating Procedures (SOPs) and Federal- and state-specific guidelines. EPA regulates 188 Hazardous Air Pollutants (HAPs), which are chemicals that pose potential health risks to exposed persons. The ER/MP UAVS is not anticipated to emit significant quantities of HAPs. As appropriate, installation environmental staff personnel where ER/MP UAVS activities occur would evaluate the necessity of modifying the Title V Permit of their installation.

The Montreal Protocol on Substances that Deplete the Ozone Layer, to which the United States is a signatory, calls for a phase out of the production and consumption of these substances. Pursuant to Section 611 of the Clean Air Act Amendments (CAAA), EPA requires labeling for products manufactured with, containers of, and products containing specific Ozone-Depleting Chemicals (ODCs). Since 1 June 1993, ozone-depleting substances (ODSs) may not be used in products procured by the Federal government without approval from a senior acquisition official. In accordance with Executive Order (EO) 12843, Federal agencies have been directed to conform their procurement regulations and practices to the policies and requirements of Title VI of the CAAA, which deals with stratospheric ozone protection and the evaluation of present and future uses and recycling methods of ODSs. This includes taking measures to revise procurement practices and implement cost-effective programs such as the modification of specifications and/or contracts by substituting non-ODSs to the extent economically practicable. It is Army policy to minimize the procurement, use, and emissions of ODSs to the greatest extent possible. ODSs will be not utilized in any part of the ER/MP UAVS (UAVS, 2004b).

Biological Resources

Biological resources include vegetation, fish and wildlife, threatened and endangered species, wetlands, and unique habitats. Numerous environmental laws have been instituted to protect biological resources on Federal and state facilities, for example the Endangered Species Act (ESA) of 1973. Federal and state facilities where ER/MP UAVS activities take place would comply with the guidelines established by the ESA, and other Federal or state regulations that administer guidelines to protect biological resources through the NEPA process. Prior to undertaking any activity on a Federal installation, the site-specific Integrated Natural Resources Management Plan would be consulted to assure all planned activities conform to the requirements of the plan.

Criteria for determining the significance of potential impacts to biological resources are based on the importance of the resource, the number or amount of the resource that would be impacted, the sensitivity of the resource to the Proposed Action, and the duration of the impact. Impacts are considered significant if they are determined to have the potential to reduce the population size of Federal- and/or state-listed threatened or endangered species, degrade biologically important unique habitats, or cause long-term loss of vegetation and/or wildlife habitat.

Potential impacts to flora, fauna, and associated ecosystems attributable to ER/MP UAVS activities would potentially occur during test area preparation and activities associated with the movement and operation of ground support equipment on unimproved surfaces.

Cultural Resources

Cultural resources include prehistoric, historic, and Native American resources. The first step in the analysis of impacts to cultural resources is to define the Area of Potential Effect (APE). Next, resources listed or eligible for listing on the National Register of Historic Places, pursuant to the National Historic Preservation Act (NHPA) of 1966, or those that are considered cultural items pursuant to the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 are identified. Then the potential effects of the Proposed Action and its alternatives are considered.

ER/MP UAVS operations and training activities could impact cultural resources. Potential effects to cultural resources may require early consultation by installation environmental staff with the State Historic Preservation Officer, Tribal Historic Preservation Officer and/or the Advisory Council on Historic Preservation (ACHP), pursuant to NHPA Section 106. Depending on the type of cultural resource, consultation with Native American tribal representatives may also be required under NAGPRA. The ACHP's regulations, 36 CFR 800, were published in the *Federal Register* on May 18, 1999.

Federal facilities where ER/MP UAVS activities take place would comply with the guidelines established by the NHPA, other Federal regulations, and state regulations that administer guidelines to protect cultural resources through the NEPA process. Prior to undertaking any activity on a Federal installation, the site-specific Cultural Resources Management Plan would be consulted to assure all planned activities conform to the requirements of the plan.

Hazardous Materials

Under Department of Transportation (DOT) rules, hazardous materials are substances or materials that have been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce. The term includes hazardous substances, hazardous wastes, marine pollutants, elevated-temperature materials, materials designated as hazardous under the provisions of 40 CFR 172.101, and materials that meet the defining criteria for hazard classes and divisions in 49 CFR 173. The hazard categories include: explosives, gases, flammable liquids, flammable solids, spontaneous combustibles and dangerous when wet; oxidizers and organic peroxides; poisons and infectious substances; corrosives, and all other hazardous materials.

Several Federal agencies oversee various aspects of hazardous material usage. DOT regulates the safe packaging and transporting of hazardous materials, as specified in 49 CFR parts 171 through 180 and Part 397. The Occupational Safety and Health Administration (OSHA) regulates the safe use of hazardous materials in the workplace in 29 CFR, primarily Part 1910. Other environmental, safety, and public health issues associated with hazardous materials are regulated by the EPA through specific criteria applied to areas such as air emissions and water discharge.

The Department of Defense has worked closely with the aerospace industry to adopt National Aerospace Standard (NAS) 411 "Hazardous Materials Management Program." NAS 411, adopted by DOD in March 1994, provides a flexible, systematic process for managing hazardous materials in the acquisition and life-cycle of a system. The standard will help reduce hazardous materials usage and the generation of pollutants, not only during manufacturing, but also during the operations and maintenance phases of the ER/MP UAVS over its life-cycle. NAS 411 provides a uniform method for a contractor to identify all hazardous materials and to manage, minimize, and eliminate them whenever possible. A critical element of NAS 411 is progress reports from the contractor detailing:

- Lists of hazardous materials the contractor must use because of military specifications and standards;
- Lists of hazardous materials the contractor must use because no alternative technology exits to meet performance requirements; and
- Trade-off analyses to determine alternatives that decrease environmental liabilities and decrease cost.

Hazardous Waste

Under the Resource Conservation and Recovery Act (RCRA), and defined in 40 CFR 261, a solid waste that, because of quantity, concentration, or physical, chemical, or infectious characteristics, causes or significantly increases mortality or serious irreversible or incapacitating reversible illness, or poses a substantial present or potential hazard to human health or the environment when improperly managed is determined to be a hazardous waste.

This can include both solid and containerized liquid materials. Hazardous waste is further defined in 40 CFR 261.3 as any solid waste not specifically excluded that meets specific concentrations or has certain toxicity, ignitability, corrosivity, or reactivity characteristics.

Oversight of hazardous waste issues is provided primarily by the EPA and state regulatory agencies, as mandated by RCRA and the Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act (CERCLA/SARA).

Federal facilities where ER/MP UAVS activities occur would comply with the guidelines established by RCRA and other Federal or state regulations that administer guidelines for the proper handling and disposal of hazardous waste.

Health and Safety

Health and safety includes consideration of any activities, occurrences, or operations that have the potential to affect one or more of the following.

- The well-being, safety, or health of workers - Workers are considered persons directly involved with the operation or who are physically present at the operational site.

- The well being, safety, or health of members of the public - Members of the public are considered persons not physically present at the location of the operation, including workers at nearby locations who are not involved in the operation and the off-installation population.

OSHA is responsible for protecting worker health and safety in non-military workplaces. Relevant OSHA regulations are found in 29 CFR 1910. Protection of public health and safety is an EPA responsibility and mandated through a variety of laws such as RCRA, CERCLA/SARA, the Clean Water Act (CWA), and the CAA. EPA regulations are found in 40 CFR 265.382. Additional safety responsibilities are placed on the DOT in 49 CFR. Department of the Army program requirements are outlined in AR 385-10, *Army Safety Program*.

Infrastructure and Transportation

Infrastructure addresses facilities and systems that provide power, water, wastewater treatment, the collection and disposal of solid waste, fire, health, and police services. Transportation addresses the modes of transportation (air, road, rail, and marine) that provide circulation within and access to installations. Infrastructure and transportation issues are not expected to be significantly impacted by the Proposed Action. Installations where ER/MP UAVS are based would be required to address these issues under separate NEPA site-specific documentation.

Land Use

Land use describes the use of testing, training, and operational locations and the area surrounding these proposed locations. Federal and state facilities where ER/MP UAVS activities occur are generally established for similar land uses and therefore are not anticipated to be impacted by the Proposed Action. Any construction or expansion efforts pertaining to the ER/MP UAVS system would be evaluated by a site-specific NEPA documentation prepared by the Environmental Office of the respective facility.

Noise

The Noise Control Act establishes a policy to promote regulation of noise to achieve an environment free from harmful effects to the health and welfare of individuals and society as a whole. Noise can be defined as unwanted sound, occurring when a receptor has an appreciation for the sound received. Sensitive noise receptors can include both human beings as well as biological resources.

Through their Environmental Noise Management Program (ENMP) the Army evaluates and manages impacts on and off installations from noise producing activities. The purpose of the ENMP is to minimize encroachment into noise sensitive zones by noise-generating activities. All installations are expected to be in conformance with their associated ENMP.

Noise impacts from the ER/MP UAVS would be expected to be minimal. Testing and training activities would occur on ranges or installations that are cleared for these types of activities. Personnel involved with these activities would adhere to hearing protection requirements defined in health and safety plans and guidelines.

Geology and Soils

Geology refers to the structure and composition of the surface and subsurface materials that are characteristic of a particular area. Soils refer to the uppermost layer of residuum of a particular area. A number of federally mandated regulations are in place to protect the geology and soils of DoD facilities. Executive Order 12088, *Compliance with Pollution Control Standards,* ensures Federal Government compliance with applicable pollution control standards and conveys the responsibility for compliance to the head of each executive agency. The Federal Facilities Enforcement Office of the EPA audits compliance to these standards by means of its environmental auditing policy that is published in the Federal Register (51 CFR 25004). ER/MP UAVS activities would also be regulated by each installation's Hazardous Materials and Waste Management Plan and AR-200-1, *Environmental Protection and Enhancement.* Federal and state facilities where ER/MP UAVS activities occur would comply with the guidelines established by Federal or state regulations that administer guidelines for the protection of geology and soils.

Minor impacts to geology and soils could result from activities associated with the acquisition of the ER/MP UAVS. Primary impacts would be an increase in erosion potential. Testing and training activities would be conducted in areas specifically cleared for and routinely used for similar activities.

Socioeconomics

Socioeconomic impact regions typically include: current and projected population and relevant demographic characteristics; local government revenues, expenditures, and revenue-sharing arrangements; current and projected housing capacity; current and planned public service capacity (water, sewer, transportation, police, fire, health, education, and welfare); economic structure and labor force characteristics; local government characteristics; local organizations and interest groups; social structure and life styles and local support or opposition to the proposed project. It is not anticipated that the socioeconomic impact of the Proposed Action would be significant. Activities associated with the Proposed Action have occurred in areas where similar activities currently occur and no significant increases to existing activity levels are anticipated.

Water Resources

To protect both surface water and groundwater resources, and human health, Congress enacted the CWA and the Safe Drinking Water Act (SDWA). The EPA has also established water quality standards to protect water resources. Army Regulation 200-1, Chapter 3, implements the Army's Water Management Program. Federal and state facilities are under strict guidance in order to protect the water resources at the facilities. Ground water and surface water monitoring programs and wastewater management plans facilitate the ongoing assessment concerns regarding water resources.

4.3 Acquisition Process

Recent changes in the DoD acquisition process have streamlined the process and increased flexibility for acquisition programs. They established multiple acquisition process paths and established "entrance criteria" for entering the next acquisition phase.

The acquisition process is now divided into five phases – Concept Refinement; Technology Development; System Development and Demonstration; Production and Deployment; and Operations and Support. As mentioned, the acquisition process now allows for program entry at various points depending on concept and technology maturity. Milestones A, B, and C (formerly I, II, and III) occur at entry into Technology Development, System Development and Demonstration, and Production and Deployment phases respectively (Figure 4-1).

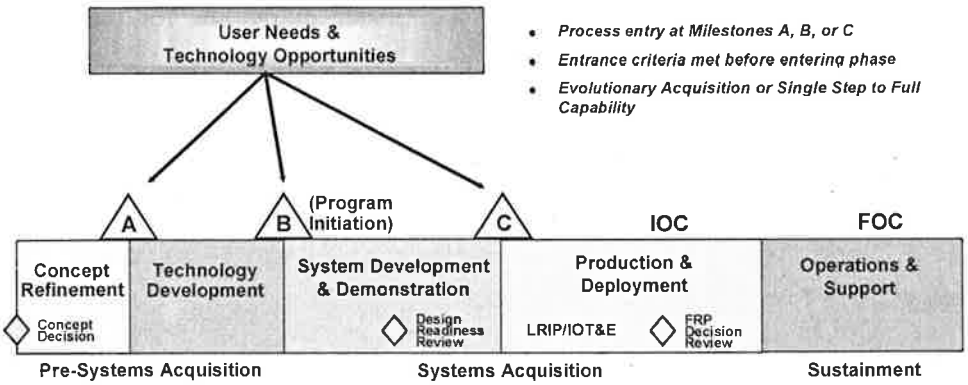

Figure 4-1: Defense Acquisition Management Framework

The ER/MP UAVS will follow a development process using a prioritized increment and technology spiraling approach for development. Capabilities will be developed and delivered in increments over time intended to support the warfighter's tactical and training requirements. These increments are prioritized. The initial increment is limited by available force structure, but provides for immediate warfighting needs. It provides the increased endurance and range required by the Corps/UE while maintaining the capability to support subordinate units. The initial increment will provide an EO/IR LRF/LD and SAR/MTI sensor suite capable of supporting RSTA missions. Additionally, this increment will provide an enhanced communications package designed to support the WCP mission, and a weapons ready AV platform, including internal cabling, capable of carrying future lethal/non-lethal external stores. Increment II provides a beyond threshold capability. Future increments will provide additional RSTA missions while enhancing the multi-purpose role by providing SIGINT, EA, future payloads/external stores (Lethal/Non-Lethal, Logistics Delivery, etc.), and multi-functional missions to provide mine, chemical and biological detection and support. (U.S. Army Aviation Center, undated)

The following sections are organized such that ER/MP UAVS can be addressed with regards to the current phase of acquisition in the life-cycle. A description of the activities and alternatives for each system is presented, followed by an assessment of the environmental impacts anticipated from those activities during the specific phases of the acquisition life-cycle. Where

appropriate, adverse effects and conflicts which cannot be avoided are listed, in addition to recommended mitigation procedures where required. The ER/MP UAVS is currently in the Technology Development phase, and is anticipating a Milestone B decision in the Second Quarter of Fiscal Year (FY) 2005 (2QFY05). A Low Rate Initial Production (LRIP) Decision will be sought at Milestone C, currently scheduled for 4QFY07. A Full Rate Production (FRP) Decision will be sought in 4QFY09. The Horizontal Technology Insertion (HTI) process will be utilized throughout the life of the program.

4.3.1 Concept Refinement

The purpose of this phase is to refine the initial concept and develop a Technology Development Strategy (TDS). Entrance into this phase depends upon an approved Initial Capabilities Document (ICD) resulting from the analysis of potential concepts across the DoD Components, international systems from Allies, and cooperative opportunities; and an approved plan for conducting an Analysis of Alternatives (AoA) for the selected concept, documented in the approved ICD.

Concept Refinement begins with the Concept Decision. The Concept Refinement phase includes concepts exploration that is primarily paper studies of concepts to meet a mission need. The focus of these efforts is to define and evaluate the feasibility of alternative concepts and to provide a basis for assessing the relative merits (i.e. advantages and disadvantages, degree of risk, etc.) of these concepts. An analysis of alternatives is used to facilitate comparisons of alternative concepts. The AoA shall assess the critical technologies associated with these concepts, including technology maturity, technical risk, and, if necessary, technology maturation and demonstration needs. To achieve the best possible system solution, emphasis shall be placed on innovation and competition. Existing COTS functionality and solutions drawn from a diversified range of large and small businesses shall be considered. Concept Refinement ends when the Milestone Decision Authority (MDA) approves the preferred solution resulting from the AoA and approves the associated Technology Development Strategy.

4.3.1.1 Description of Activities for Concept Refinement

The Concept Refinement Phase consisted of competitive, parallel short-term concept studies. The focus of these efforts was to define and evaluate the feasibility and disadvantages of these concepts. Analysis of alternatives were used, as appropriate, to facilitate comparisons of alternative concepts. The most promising system concepts were defined in terms of initial, broad objectives for cost, schedule, performance, software requirements, opportunities for tradeoffs, overall acquisition strategy, and test and evaluation strategy. Activities relating to this phase are generally paper studies and analytical in scope.

4.3.1.2 Environmental Impacts of Activities and Alternatives

No environmental impacts were recognized during this phase.

4.3.2 Milestone A: Technology Development

The purpose of this phase is to reduce technology risk and to determine the appropriate set of technologies to be integrated into a full system. Technology Development (TD) is a continuous technology discovery and development process reflecting close collaboration between the Scientific & Technical community, the user, and the system developer. It is an iterative process designed to assess the viability of technologies while simultaneously refining user requirements.

TD begins with Milestone A. Activities include examining alternative concepts, including cooperative opportunities and procurement or modification of systems or equipment, to meet a MNS. This phase ends when an affordable increment of militarily-useful capability has been identified, the technology for that increment has been demonstrated in a relevant environment, and a system can be developed for production within a short timeframe (normally less than five years).

Alternative system designs were solicited from private industry primarily. The most promising system concepts were defined in terms of initial, broad objectives for cost, schedule, and performance; identification of interoperability, security, survivability, operational continuity, technology protection, operational support, and infrastructure requirements within a family of systems; opportunities for tradeoffs, and an overall acquisition strategy and test and evaluation strategy (including Developmental Test and Evaluation (DT&E), Operational Test and Evaluation (OT&E), and Live Fire Test and Evaluation (LFT&E)). The work in Concept Exploration normally is funded only for completion of concept studies contracts. This work effort ends with a review, at which the MDA selects the preferred concept to be pursued for which technologies are available.

4.3.2.1 Description of Activities for Technology Development

In the Technology Development Phase, the MNS was defined as a requirement for a weapons-capable, long endurance RSTA, C4I UAV supporting the full spectrum of Army operations including offensive, defensive, stability, and support operations. It was determined that the ER/MP UAVS should be designed to give maneuver commanders superior situational awareness for improved wide-area target acquisition and tracking to conduct both shaping and decisive operations with greatly increased lethality. The need is for a day/night, adverse weather, multi-sensor collection system with improved connectivity to joint forces that provides needed, real-time battle information that cannot be observed from standoff airborne sensor systems, ground collection systems, and scouts.

During the TD phase, the source selection evaluation consisted of two phases. The first phase began with an evaluation to determine whether the offeror's proposal complies with the Government's Request for Proposal. The second phase consisted of a Systems Capabilities Demonstration (SCD) (flight testing and associated supportability demonstrations) of the existing system against predetermined and published flight scenarios as well as evaluation of contractor submitted proposals. (UAVS, 2002) The two best-qualified vendors were selected to participate in a demonstration of their systems' capabilities, as defined in their respective proposals.

The development, integration, and test strategy for ER/MP UAV will draw upon lessons learned from previous UAV programs, specifically Hunter and Shadow. DT&E will be structured to verify the status of the ER/MP UAV development effort and that design risks are minimized. The first testing of the ER/MP UAVS will be during the SCD. The SCD will be used to down select to the final System Development and Demonstration (SDD) contractor. Some of this data may be used to support the Milestone B decision. The primary purpose of the demonstration is to verify the design, performance, and technical maturity of the current AV configuration and to assess risk to achieve the maturity and performance of the contractors' proposed system (Increment I configuration), which will be the delivered SDD systems. The demonstration will correlate proposed capabilities with current demonstrated capabilities. This demonstration will lead to one of the contractors being competitively selected to continue into the SDD phase.

The SCD will consist of a 3-week demonstration by each contractor and will be conducted at Fort Huachuca, Arizona. The demonstration will consist of a ground demonstration phase and a flight performance/evaluation phase. During the ground demonstration phase, each contractor will demonstrate current capabilities as they relate to: Air and Ground Transportation (package, assembly and disassembly), system emplacement and displacement (operations and timeline), roles and operations of the contractor logistics support, field maintenance operations, performance of routine maintenance functions, emergency and safety procedures, performance of built-in-test capabilities, evaluation of Manpower and Personnel Integration domains, and logistics support operations with associated handling equipment and tools. During the flight demonstration phase, each contractor will demonstrate current capabilities as they relate to: endurance, service ceiling, dash and loiter speeds, payloads capacity, AV's ability to process and execute waypoint navigation, precision and accuracy of onboard avionics system, launch and recovery operations, and AV performance while accumulating a prescribed number of flight hours on a single AV. The contractor will present, or demonstrate in flight, their existing capability for Airborne Data Relay. In order to evaluate the AV's contribution to Target Location Error, the contractor shall perform target location operations using their integrated surrogate EO/IR payload. To demonstrate the AV's weapons capable performance, the contractor will include hard-points for adapting two contractor-furnished ballast fixtures (at 200 lbs each). The flight test phase will consist of 1 day for contractor familiarization/check flights, 4 days of demonstrations to established flight profiles, 1 day for contractor free demonstration, and 1 day for make-up flights. The flight profiles will evaluate the existing capabilities, including AV and payload performance, TLE, range and endurance, lost link capabilities, etc. Some of this data may be used to support the Milestone B decision.

4.3.2.2 Environmental Impacts of Technology Development Activities

There are no significant environmental impacts anticipated during this phase of the acquisition process.

4.3.3 Milestone B: System Development and Demonstration Phase

The purpose of SDD is to develop a system or an increment of capability; reduce integration and manufacturing risk (technology risk reduction occurs during TD); ensure operational supportability with particular attention to reducing the logistics footprint; implement human systems integration; design for producibility; ensure affordability and the protection of critical

program information by implementing appropriate techniques such as anti-tamper; and demonstrate system integration, interoperability, safety, and utility. Development and demonstration are aided by the use of simulation-based acquisition and test and evaluation integrated into an efficient continuum and guided by a system acquisition strategy and test and evaluation master plan.

4.3.3.1 Description of Activities for System Development and Demonstration

Following a successful Milestone B decision, the SDD contract will be awarded to the selected contractor to integrate the selected AV and associated equipment into the GCS and to continue development of other key systems. Completed Milestone B documentation and completed source selection to include SCD are the entrance criteria to enter SDD.

During SDD, the contractor will assist the Government in preparing joint and intra-Army interoperability documentation including Concept of Operations (CONOPS)-coordinated mission threads and Interface Control Documents (ICDs) that will define the interfaces necessary to comply with the current and future Army UAV Architecture and the Joint Technical Architecture (JTA). Concurrent development of Test-Analyze-Fix-Test (TAFT) and training assets will allow for component and system testing, correcting and retesting, along with training operators and pilots. The performance evaluation will include selected ground/flight tests at either a government or contractor (certified) test facility. Ground tests may include electromagnetic environmental, natural and induced environmental, vulnerability/survivability, transportability, and logistics evaluation. System level flight tests will be conducted to prove compliance with the performance specification and requirements documents.

SDD will include an evolutionary C4I development intended to fulfill Increment I critical IERs via both hardware and software enhancements to the GCS. This will allow ER/MP UAVS to demonstrate intra-Army and Joint interoperability in the Software Blocking 3 timeframe as required for a successful Milestone C decision.

Critical engineering reviews envisioned during the SDD phase include: System Requirements Review (SRR), Preliminary Design Review (PDR), System Functional Review (SFR), and Critical Design Review (CDR). A major program event during the SDD will be the Design Readiness Review (DRR) that marks the decision point for moving from system design into system development.

During the SDD Phase, the contractor will build TAFT; Modeling and Simulation (M&S); and training assets. The TAFT assets will be used to conduct Government Developmental Testing (DT), training, and the Limited User Testing (LUT). The system produced during SDD will support the performance and environmental testing. The system will go through two phases of DT. The first phase will be the Engineering Developmental Testing (EDT) where the contractor will qualify subsystems/components and perform integration testing. The second phase will be the Production Prove-out Testing where system level performance/qualification testing, to include environmental qualification and Joint Interoperability Test Command certification, will be completed. Some form of operational testing (i.e. Limited User Test) will also be completed during SDD to support an operational assessment. (PEO Aviation, 2004)

DT&E will be a combined contractor/Government effort and will be conducted to verify that the resulting Increment I delivered systems meet the size, range, endurance, and performance required by the ER/MP UAV ORD. DT will include EDT, which includes contractor subsystem and system level testing; interoperability testing; and a Production Prove-out Test (PPT). The strategy is to test the integrated system, once the AV and the GCS (with C4I capabilities) development and integration into the UAV system have matured sufficiently and the contractor-level testing has been satisfactorily completed. The basis for the DT effort will be the selected UAV contractor's proposed Coordinated Test Plan, which outlines the contractor's overall test strategy, including test support requirements. The minimum developmental tests and performance requirements that must be performed or demonstrated prior to Initial Operational Test and Evaluation (IOT&E) include:

- **Human Systems Integration** (HSI) will be addressed throughout the UAV program using commercial equivalent safety guidance. Where no commercial equivalent safety guidance exists, military safety standards will be used. Health Hazard Assessments (HHAs) will be part of the safety program to allow a safety release prior to training and IOT&E. Man-Machine Interface (MMI) requirements will be evaluated during early phases of development, using the SCD-demonstrated system configuration as the baseline. This will be used to verify equipment/operator/maintainer Human Factors Engineering (HFE) requirements are satisfied and provide an early indication of the ability to maintain the UAV Operations Mode Summary/Mission Profile (OMS/MP) tempo.

- **Safety**. System Safety analyses will be performed to include preliminary subsystem, system, software, operational, and support hazard analyses. The UAVS Project Office will be responsible for developing, maintaining and implementing the System Safety Management Plan (SSMP). The System Safety Working Group (SSWG) will review, evaluate and provide inputs to the SSMP. All identified hazards will be reviewed by the SSWG and residual hazards will be processed for risk management decision-making by the appropriate levels of management IAW AR 385-16. Safety evaluations of operations and maintenance hazards and procedural hazard controls, including those associated with man-machine interfaces will be conducted during the Logistics Demonstration. Failures related to safety or flight performance are critical failures and will be re-tested to verify corrective actions have been performed, and the Government has approved the final solution. The SDD contractor will prepare a Safety Assessment Report documenting the system safety program, system design with safety features, and hazard analyses. Safety data will be presented to the Army Test and Evaluation Command (ATEC) Developmental Test Command (DTC), and the U.S. Army Aviation and Missile Command (AMCOM) Safety Office. ATEC DTC will review the data and provide a safety release to support the use of operational personnel during ER/MP UAV testing conducted by the Army.

- **Airworthiness.** The contractor will present a schedule and Airworthiness approach at the PDR, CDR and Test Readiness Review (TRR) that details the resources required and actions needed to achieve airworthiness. The contractor

will present substantiating data to include drawings and relevant software requirements and design information for the purpose of airworthiness certification. The MIL-HDBK-516 will be used for guidance for the airworthiness certification criteria. Airworthiness Authority will be IAW AR 70-62 and Federal Aviation Association (FAA) 14 CFR.

The UAV System Level Performance Test (SLPT) will be conducted as a combined contractor/Government effort where practical. The contractor will perform system-level SLPT before the Government system-level SLPT. For the Government conducted flight test, the UAV contractor will support with necessary technical, operational, and maintenance support. Specific support tasks and roles for the contractor to perform have yet to be defined. SLPT will be conducted to verify that the AV and related ground control, data link, and launch/recovery hardware and software meet the appropriate specification and system requirements for ground operations (launch/recovery, emplacement/displacement); mission planning; flight; guidance, navigation and control; visual and acoustical survivability requirements; target detection, recognition, and location; TLE; data link, analysis, and storage; tactical communications; and other required interfaces.

After meeting the SDD exit criteria, supported by the System Evaluation Report (SER), the program will proceed to Milestone C for LRIP authority. The SDD and TAFT assets will be refurbished to production level configuration for Operational Tempo (OPTEMPO) and IOT&E.

4.3.3.2 Environmental Impacts of System Development and Demonstration Activities

The development, integration, and test strategy for ER/MP UAVS will draw upon lessons learned from previous UAV programs, specifically Hunter and Shadow. DT&E will be structured to verify the status of the ER/MP UAVS development effort and that design risks are minimized. In addition, DT&E will be used to substantiate achievement of the contract performance requirements, as well as certifying the ER/MP UAV system's readiness to achieve a successful IOT&E.

During this phase, the contractor will be required to prepare a System Safety Program Plan (SSPP), and. support the SSWG. The contractor will also prepare the System Safety Assessment Reports and System Safety Hazard Analysis Reports. Based on safety analysis findings and IAW the SSPP, the contractor will identify hazards, assess hazard risk, identify the hazard risk mitigation measures, eliminate hazards through design selection, incorporate safety devices/features, provide warning devices, and appropriately develop/update procedures and training following Program Executive Officer, Aviation Policy Memorandum Number 03-02.

All identified mishap risks will be reduced to acceptable levels and verification will be provided of mishap risk reduction. Hazards will be tracked through closure and residual mishap risk. Any residual mishap risk must be approved by the Government at the appropriate level as defined in Program Executive Office Aviation, Aviation Policy Memorandum Number 03-02, *Risk Management Process.* All safety critical software will be identified, tracked, and managed appropriately. The Supportability Integrated Product Team (SIPT) will review and assess on-going program flight and field operations regarding safety issues to include, but not be limited

to, reviews of operations, maintenance, and training procedures/documents. In case of an incident involving ER/MP UAVS assets, incidents will be reported to the UAVS PO. Other specific safety program requirements are outlined below:

- Administer Aviation Accident Prevention Program
- Serve as Point of Contact and administrator for Flight Line Operation Hazard Report
- Ensure compliance with Government Flight Representative requirements
- Coordinate and administer Accident/Mishap investigations
- Ensure and audit Flight Line and Hangar Safety compliance
- Serve as primary interface with Occupational Safety and Health Manager

During the review of existing environmental documentation including the *Environmental Assessment for the Operations, Training, and Testing of Unmanned Aerial Vehicles at Redstone Arsenal, Alabama* (May 2004), there were no significant impacts identified for this phase of the acquisition process. Limited quantities of prototype ER/MP UAVS would be acquired as necessary to prove concepts and support testing activities. No contradictory data was discovered that would indicate that this limited acquisition and testing produced significant environmental impacts. It is anticipated that these activities would occur at ranges and installations where similar activities routinely are conducted. Impacts to specific Federal installations would be evaluated under separate environmental documentation developed by the installations where these activities occur.

4.3.4 Milestone C: Production and Deployment Phase

The purpose of this phase is to achieve an operational capability that satisfies mission needs. The operational test and evaluation determines the effectiveness and suitability of the system. Milestone C authorizes entry into LRIP.

Entrance into this phase depends on the following criteria: acceptable performance in development, test and evaluation and operational assessment; mature software capability; no significant manufacturing risks; manufacturing processes under control (if Milestone C is Full-Rate Production (FRP)); an approved Initial Capabilities Document (if Milestone C is program initiation); an approved Capability Production Document (CPD); acceptable interoperability; acceptable operational supportability; compliance with the DoD Strategic Plan; and demonstration that the system is affordable throughout the life-cycle, optimally funded, and properly phased for rapid acquisition. The CPD reflects the operational requirements resulting from SDD or an Advanced Concept Technology Demonstration (ACTD) and details the performance expected of the production system. If Milestone C approves LRIP, a subsequent review and decision shall authorize FRP.

Low Rate Initial Production

This effort is intended to result in completion of manufacturing development in order to ensure adequate and efficient manufacturing capability and to produce the minimum quantity necessary to provide production or production-representative articles for IOT&E, establish an initial production base for the system; and permit an orderly increase in the production rate for the

system, sufficient to lead to FRP upon successful completion of operational (and live-fire, where applicable) testing.

Full-Rate Production Criteria

A Major Defense Acquisition Program (MDAP) may not proceed beyond LRIP without approval of the MDA. The available knowledge to support this approval shall include demonstrated control of the manufacturing process and acceptable reliability, the collection of statistical process control data, and the demonstrated control and capability of other critical processes. The decision to continue beyond low-rate to FRP, or beyond limited deployment of automated information systems or software-intensive systems with no developmental hardware, shall require completion of IOT&E, submission of the Beyond LRIP Report for Developmental Operational Test & Evaluation (D/OT&E) Oversight Programs, and submission of the LFT&E Report (where applicable) to Congress, to the Secretary of Defense, and to the Acquisition Technology and Logistics (AT&L) branch of the Undersecretary of Defense (USD).

Full-Rate Production and Deployment

Continuation into FRP results from a successful FRP Decision Review by the MDA (or person designated by the MDA). This effort delivers the fully funded quantity of systems and supporting materiel and services for the program or increment to the users. During this effort, units shall attain Initial Operational Capability.

4.3.4.1 Description of Activities for Production and Deployment

An integrated T&E approach will be used to merge developmental and operational T&E whenever practical to avoid redundancy. The T&E will address all Critical Test Parameters. The ER/MP UAVS testing ensures the hardware and software meets critical requirements, demonstrates design integrity, and operates safely. The T&E verifies progress of engineering and development; minimization of design risk; conformance to contract requirements; and readiness for an operational environment.

The OT&E program will use the System Evaluation Plan (SEP) as the foundation for system evaluation. The OT&E of the ER/MP UAVS will occur at several venues. Technical testing verified and validated during developmental testing will help to ensure readiness for testing in an operational environment. Data collected during testing will be accumulated for statistical analysis and used for assessing the issues and criteria. The operational effectiveness is expressed in terms of the capability of the ER/MP UAVS to support the Commander's RSTA and communications relay requirements. Operational suitability is expressed in terms of supporting the Corps/UE wartime OPTEMPO, Reliability, Availability, and Maintainability (RAM) requirements, and support burden as described in the ER/MP ORD.

OT&E for ER/MP will consist of several Operational Test (OT) events (such as an Operational Assessment, LUT), culminating in an IOT&E. Test events to support Increment I will include system level testing of ER/MP UAVS with the integration of threshold payloads (EO/IR/LD/LRF), SAR/GMTI, WCP, as they are available. In addition, DT and IOT&E will

determine if ER/MP UAVS has sufficient internal wiring and hard points to be considered weapons capable and support full-up weaponization as required. These efforts will culminate in an operational assessment that will verify system maturity and readiness for IOT&E. Trained UAV operators and maintainers will participate in the operational tests.

If new weapons are to be carried, then LFT&E may be required for these new weapon systems. If fielded weapons were carried, then lethality testing would only be conducted if insufficient data were available for the munition-target pairings of interest. Weapons having well-characterized lethality performance may preclude the need for additional testing provided information is available for the targets of interest. Weapons without lethality data for the targets of interest will require a plan to generate the information needed for the lethality evaluation.

Based on the D/OT&E report and the Beyond-LRIP (B-LRIP) report, the UAVS PO will seek a Full-Rate Production decision in 3QFY09. The B-LRIP report will address operational effectiveness, operational suitability and survivability of the ER/MP UAV.

LRIP of the first system will consist of five GCSs, five TCDL GDTs, two PGCS, two TCDL PGDTs, one ground SATCOM system, twelve AVs each equipped with multi-mission payloads, and SEP, and associated Ground Support Equipment (GSE). Six of the twelve AVs will be equipped with airborne SATCOM systems. This LRIP serves several purposes: establishes the production base; acquires production systems; supports tactics, techniques, and procedures development; and provides lessons learned from testing to incorporate into the production baseline. LRIP authority will be requested to include one (1) additional system, if required, to maintain forward momentum and production capabilities.

The Initial Operational Capability (IOC) for the ER/MP UAVS will be attained after the Army has fielded three systems with Integrated Logistics Support (ILS) procurement (training, spares and technical publications) and testing completed. The level of performance necessary to achieve IOC requires one system in a final configuration with operators and maintenance personnel trained and initial spares with interim repair support in place. Full Operational Capability (FOC) will be achieved when all maintenance and repair support, software support, test equipment and spares are in place and all systems are fielded. The IOC is required for First Quarter FY09 and the FOC is required for FY10.

During the Production and Deployment phase, a production qualification/verification test will be completed as well as an Initial Operational Test (IOT) to support the FRP decision. A logistics demonstration will be completed prior to the IOT.

4.3.4.2 Environmental Impacts of Production and Deployment Activities

The eleven broad environmental components previously described in Section 4.1 were considered to provide a context for understanding the potential effects of the Proposed Action. Federal and/or State environmental statutes that set specific guidelines, regulations, and standards regulate most of these environmental components. These standards provide benchmarks for determining the significance of environmental impacts. The potential for environmental impacts associated with the ER/MP UAVS during Production and Deployment

would be minimal. Impact potential associated with the ER/MP UAVS would be anticipated in: air quality, biological resources, hazardous materials and waste, health and safety, infrastructure and transportation, noise, and geology and soils. Impact potential would be associated with testing activities of the system. The environmental staff(s) of the installation(s) where the systems would be field-tested would evaluate these potential impacts. No potential impacts would be anticipated for the areas of land use and socioeconomics.

Impacts associated with production are those typically associated with manufacturing and testing. These include air emissions from painting and solvent use; water resources impacted from effluent produced during manufacturing; hazardous materials and resultant hazardous waste; and health and safety impacts. Production of the ER/MP UAVS components would be anticipated to occur at existing commercial contractor facilities and these manufacturing processes would be addressed by the production contractor's environmental and health and safety programs. Commercial production facilities would have environmental programs in place to ensure compliance with existing Federal, state, and local regulations, as well as any required environmental permits (e.g., water, air, and hazardous waste). The UAVS PO directs that toxic chemicals, hazardous substances, radioactive materials, and ODCs should be avoided where feasible.

Air Quality

Potential impacts to air quality from the system evaluated would be principally associated with emissions and fugitive dust from support vehicle operations. The effects of these hazards would be localized and of short duration due to the rapid disbursement of toxic airborne substances (e.g., lead and PM_{10}). Contractors that manufacture components of the system would be expected to be compliant with all Federal, state, and local regulations.

Biological Resources

Minor impacts to biological resources (disturbances to vegetation/habitat and wildlife) could occur at deployment locations for the described system. Strict adherence to local installation regulations and guidance concerning the protection of wetlands, and threatened and endangered species and their habitats must be observed.

Cultural Resources

Federal facilities where ER/MP UAVS activities take place would comply with the guidelines established by the NHPA, and other Federal or state regulations that administer guidelines to protect cultural resources through the NEPA process.

Geology and Soils

Minor impacts to geology and soils could result from the operation of the various support vehicles associated with the ER/MP UAVS. Primary impacts would be an increase in erosion potential from support vehicles. Training activities would be conducted in areas specifically cleared and routinely used for similar vehicular activities.

Hazardous Materials and Waste

The ER/MP UAVS will be constructed using best commercial/manufacturing processes and insuring quality workmanship per ISO 9001-2000. The system will not expose personnel to toxic and hazardous substances in excess of the limits specified in the Code of Federal Regulations, Title 29, Chapter XVII, Sub-part Z. Materials and processes will be selected on the basis of meeting environmental regulations and hazardous waste minimization requirements during production, maintenance and repair. (UAVS, 2004a)

The Heavy Fuel Engine (HFE) will meet and/or exceed, at a minimum, the ER/MP UAVS performance requirements. The HFE will be capable of achieving acceptable operational performance using JP-8 to meet the operational temperature and altitude extremes that are likely to be encountered by the AV, and within acceptable limits. All issues associated with safe operation of the HFE would be negligible. (UAVS, 2004a)

Certain components of the ER/MP UAVS would contain batteries and other hazardous substances including flammables and fluids such as hydraulic fluids, gasoline, diesel, oils, lubricants and antifreeze. When encountered, hazardous materials and wastes would be handled in accordance with the various installations' Hazardous Materials Management Plans (HMMPs), installation permits, spill contingency plans, and other applicable Federal regulations and guidance as well as state and local regulations. NAS 411 provides a uniform method for a contractor to identify all hazardous materials and to manage, minimize, and eliminate them whenever possible. Contractors would be expected to adopt procedures contained in NAS 411 "Hazardous Materials Management Program," and would prepare a Health Hazard Assessment Report per the SOW. Following the aforementioned procedures would ensure that the potential for impacting the environment as a result of the use of hazardous materials would be minimized.

Based on the DoD and/or DOT hazard classification (proper shipping name) of the system, mode of transportation and destination; hazardous materials will be prepared for shipment in compliance with the requirements of the United Nations (UN) Transport of Dangerous goods regulations, 29 CFR, 49 CFR, FR 71-4, the International Civil Aviation Organization (ICAO), Technical Instructions for the Safe Transport of Dangerous Goods by Air and the International Maritime Dangerous Goods (IMDG) code. (UAVS, 2004a)

Health and Safety

Existing environmental documents were reviewed to determine if public and occupational health and safety concerns would be an issue for ER/MP UAVS activities. Safety regulations were also reviewed with regard to hazardous materials storage, handling and disposal. Range procedures would be reviewed and closely followed by system operators. Established safety procedures would be followed in the manufacturing and operation of the system.

All equipment will be designed in such a manner as to allow the user to emplace, operate, and displace it safely, without damage to the user or the equipment. The AV will be designed to allow the operators to maintain safe separation from other aircraft and a safe altitude in civilian airspace per FAA rules. (UAVS, 2004a)

For all hardware, software, and personnel safety, the contractor will manage, analyze, identify, and perform hazard risk assessments. The System Engineering Management Plan (SEMP) will include the contractor's approach to management of system safety to include: the system safety organization, system safety milestones, and general system safety requirements and criteria. (UAVS, 2002)

The ER/MP UAVS will be designed to minimize the possibility of personal injury and equipment damage under all conditions of normal use (setup, operation, maintenance, tear-down, and transportation) and under typical fault conditions (e.g. human error, power failure, improper cabling, electrical overstress, etc.). Design of the ER/MP UAVS will be such that Category I and II hazards, Program Executive Office Aviation, Aviation Policy Memorandum Number 03-02, *Risk Management Process* as a guide, are eliminated/mitigated unless inherent to the operational effectiveness of the application. Safety, standardization, and mishap reporting procedures will be in accordance with service safety and standardization directives. (UAVS, 2002)

No unusual health hazards were noted in the previous NEPA assessments for similar UAV systems. Also, no unusual hazards were determined in the assessment of the conceptual design, performed to support preparation of this LCEA. However, during SDD the contractor will conduct a more detailed analysis of the developing systems will identify any health hazards that may cause injury, death, or reduce soldier performance with recommendations for elimination or control. All potential health hazards are to be identified (to include those anticipated from any GFE to be used) which are indigenous to and generated by the proposed system. Potential health hazards would be identified according to those found during the operation, maintenance, and training phases, and specific mitigation or corrective measures would be made at that time. Based on similar systems, potential health hazards may include (UAVS, 2002):

- Acoustical energy (steady-state noise, impulse noise, and blast overpressure)
- Biological substances (pathogenic microorganisms and sanitation)
- Chemical substances (weapon or engine combustion products and other toxic materials)
- Oxygen deficiency (crew/confined spaces and high altitude)
- Radiation energy (ionizing and nonionizing radiation, including lasers).
- Shock (acceleration/deceleration)
- Temperature extremes and humidity (heat and cold injury)
- Trauma (blunt, sharp, or musculosketal)
- Vibration (whole body and segmental)

Infrastructure and Transportation

All ER/MP UAVS equipment will be transportable using standard Army tactical vehicles and trailers. No equipment will be removed from integral systems for transit. All shipments via any method will meet applicable CONUS and OCONUS transport requirements. All equipment will be transported worldwide via ground, rail (including withstanding rail impacts), air (by U.S. Army and Air Force C-130 aircraft), and marine (cargo ship). The storage containers will have lifting and tie-down provisions for internal/external air transport.

Land Use

Federal facilities where ER/MP UAVS activities take place are generally established for similar land uses and, therefore would not be anticipated to be impacted by the Proposed Action. Any construction or expansion efforts pertaining to the ER/MP UAVS would be evaluated by a site-specific environmental assessment prepared by the environmental office of the respective facility.

Noise

Training activities are anticipated to occur on ranges or installations previously used for similar activities and cleared for these types of activities. Personnel involved with test activities would adhere to hearing protection requirements defined in health and safety plans and guidelines. All installations would be expected to be in conformance with their associated installation ENMPs.

Socioeconomics

It is not anticipated that the socioeconomic impact to regions of the Proposed Action would be significantly impacted. The activities associated with the Proposed Action are to occur in areas where similar activities currently occur and would not result in significant increases to existing activity levels.

Water Resources

Impacts to water quality could occur at manufacturing facilities and test sites. Adherence to state and local regulations, the CWA requirements, including specific permits (e.g., Water Quality Certifications, National Pollution Discharge Elimination System Permits and Dredge and Fill Permits) would mitigate potential effects to water resources.

4.3.5 Operations and Support (Sustainment)

The objective of this activity is the execution of a support program that meets operational support performance requirements and sustains the system in the most cost-effective manner over its total life-cycle. When the system has reached the end of its useful life, it shall be disposed of in an appropriate manner. Operations and Support has two major efforts: Sustainment and Disposal. Sustainment includes supply, maintenance, transportation, sustaining engineering, data management, configuration management, manpower, personnel, training, habitability, survivability, environment, safety (including explosives safety), occupational health, protection of critical program information, anti-tamper provisions, and Information Technology (IT), including National Security Systems (NSS), supportability, and interoperability functions.

Effective sustainment of weapon systems begins with the design and development of reliable and maintainable systems through the continuous application of a robust systems engineering methodology. As a part of this process, the Project Manager (PM) will employ human factors engineering to design systems that require minimal manpower; provide effective training; can be operated and maintained by users; and are suitable (habitable and safe with minimal

environmental and occupational health hazards) and survivable (for both the crew and equipment).

At the end of its useful life, the ER/MP UAVS would be demilitarized and disposed in accordance with all legal and regulatory requirements and policy relating to safety (including explosives safety), security, and the environment. During the design process, PMs are required to document hazardous materials contained in the system and shall estimate and plan for the system's demilitarization and safe disposal.

4.3.5.1 Description of Activities for Operations and Support Phase

The ER/MP UAVS, less AVs and UAV System unique equipment, will employ the Army maintenance system that, consists of a flexible two level system per Field Manual 4-30.3, *Maintenance Operations and Procedures*

The ER/MP UAVS will be supported by the Army's two level maintenance concept: "Field" level and "Sustainment" level maintenance as described in (1) and (2) below. While these are distinct levels, there is flexibility built into the system due to overlapping capabilities. Maintainers do not lock themselves into rigid levels of maintenance under this concept. When Mission, Enemy, Terrain, Troops, Time available, and Civilian considerations (METT-TC) permit, maintainers at the various levels may also repair selected components to eliminate higher echelon backlogs and maintain technical skills. It is envisioned all maintenance, The Army Maintenance Management System-Unmanned Aerial Vehicle (TAMMS-UAVS), ground crew/flight line operations, and fuel handling for the ER/MP UAVS be accomplished by Contractor Field Support Representative (CFSR) personnel.

(1) Field Maintenance. Field Maintenance includes those tasks that are performed "on system repair" at the point of breakdown or the point of repair. At this level of maintenance, operators and maintainers fix equipment through the replacement of major system components. Field maintenance is generally performed by soldiers and maintainers assigned to the Table of Organization and Equipment (TOE) units. However, when authorized, contractors may provide field maintenance support for low density, high technical, cost-prohibitive systems.

(2) Sustainment Maintenance. Sustainment Maintenance consists of those tasks that are normally performed "off system repair". At this level of maintenance, maintainers focus on the repair of component items and their return to the distribution system. Component repair includes items such as major assemblies, Line Replaceable Units (LRUs), and repairable line items. Sustainment maintenance can be performed by corps and theater maintenance activities, special repair activities, or by contractors on the battlefield. The theater sustainment maintenance manager coordinates workloads for sustainment maintenance activities.

The LRU design will facilitate easy installation and removal, requires no special tools, and shall not cause harm to the maintainer. All LRUs will be designed to prevent improper mounting and installation. The ER/MP UAVS design will give priority to discard in lieu or repair where cost is not unduly affected. Items that require routine inspections, adjustments, or replacements will be readily accessible without disassembly or use of special tools and/or fixtures. No equipment will require periodic calibration without government approval.

The ER/MP UAVS has no immediate demilitarization requirements as per DoD 4160.21-M-I. However, the PM will ensure that ER/MP UAVS materiel disposal is carried out in a way that minimizes DoD's liability due to environmental, safety, security, and health issues. Deployed equipment that cannot be retrieved will be destroyed when possible. (UAVS, 2002)

Specific locations for maintenance, demilitarization, and disposal activities and operations have not yet been identified. The Government is conducting a Depot versus Contractor Managed Supply and Support (CMSM) study. An informed decision on contractor versus organic support will be made. Additional NEPA analysis should be conducted prior to Milestone C to review potential impacts to the human environment associated with the storage and maintenance of the ER/MP UAVS.

4.3.5.2 Direct and Indirect Environmental Impacts of Activities for Operations and Support Phase

No direct or indirect environmental impacts are anticipated for sustainment activities. Maintenance support personnel would be required to follow procedures outlined in technical manuals for the ER/MP UAVS when performing maintenance. Also, personnel would be required to be trained on the maintenance procedures of their assigned system. Additionally, maintenance personnel would be required to comply with installation Hazardous Materials and Spill Contingency plans and any applicable range procedures.

4.4 Cumulative Impacts Summary

In accordance with implementing regulations for the NEPA (40 CFR 1508.7), cumulative impacts must be addressed in an Environmental Assessment. A cumulative impact was defined by the CEQ in 1971 as the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. No cumulative impacts have been identified in this LCEA. If as the ER/MP UAVS matures data indicates that potential for cumulative impacts, these impacts would be discussed in an update of this LCEA. Individual installation NEPA documentation would consider cumulative impacts resulting from ER/MP UAVS activities and other activities at their specific locations.

4.5 Mitigation Measures Summary

No specific mitigation measures have been identified for this Proposed Action for any of the eleven resource areas that have been specified in this LCEA. Adherence to Federal, state, and local regulations, range safety procedures, permits, and installation environmental policies and procedures would generally preclude the necessity for most foreseeable mitigative measures.

4.6 Individuals/Organizations Responsible for Obtaining Required Permits/Licenses/Entitlements

During production activities, testing, and deployment, responsible personnel would comply with the requirements of all required environmental permits as well as all Federal, state, and local laws and regulations during these activities.

4.7 Conflicts With Federal, State, or Local Land Use Plans, Policies, and Controls

The Proposed Action would have no impact on land use itself and presents no known conflicts with Federal, regional, state, or local land use plans, policies, or controls.

4.8 Energy Requirements and Conservation Potential

The primary energy impact resulting from the development, production and operation of the ER/MP UAVS is fuel consumption. Anticipated energy requirements of program activities can be accommodated within the energy supply of the region. Energy requirements would be subject to any established energy conservation practices.

4.9 Natural or Depletable Resource Requirements and Conservation Potential

Other than the use of fuels during support activities, the Proposed Action requires no significant use of natural or depletable resources.

4.10 Irreversible or Irretrievable Commitment of Resources

Although the Proposed Action would result in some irreversible commitment of resources such as fuel and labor, this commitment of resources is not significantly different from that necessary for regular activities taking place at the various locations associated with the Proposed Action.

4.11 Adverse Environmental Effects That Cannot Be Avoided

There are no significant adverse environmental effects that cannot be avoided as a result of this Proposed Action.

4.12 Relationship Between Short-Term Uses of the Human Environment and the Maintenance and Enhancement of Long-Term Productivity

The Proposed Action would take advantage of existing facilities and infrastructure as well as the use of non-developmental items where available. The productivity and future usage of the land would not be impacted, and no options for future use of the environment would be eliminated.

4.13 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

The Proposed Action would be undertaken in a manner that would not substantially affect human health or the environment. The Proposed Action would also be conducted in a manner that would not exclude persons from participation in, deny persons the benefits of, or subject persons to discrimination under, the program actions because of their race, color, or national origin.

4.14 Conditions Normally Requiring an Environmental Impact Statement

The potential impacts arising from the Proposed Action were evaluated specifically in the context of the criteria for actions requiring an Environmental Impact Statement, described in DoD Directive 6050.1, *Environmental Effects in the United States of Department of Defense Actions* (U.S. Department of Defense, 1979), and 32 CFR 651, *Environmental Analysis of Army Actions* (2002).

Specifically, the proposed project activities were evaluated for their potential to:

- significantly affect environmental quality or public health and safety;
- significantly affect historic or archaeological resources, public parks and recreation areas, wildlife refuge or wilderness areas, wild and scenic rivers, or aquifers;
- adversely affect properties listed or meeting the criteria for listing on the National Register or the National Registry of Natural Landmarks;
- significantly affect prime and unique farmlands, wetlands, ecologically or culturally important areas, or other areas of unique or critical environmental concern;
- result in significant and uncertain environmental effects or unique or unknown environmental risks;
- significantly affect a species or habitat listed or proposed for listing on the Federal list of endangered or threatened species;
- establish a precedent for future actions;
- adversely interact with other actions resulting in cumulative environmental effects; and
- involve the use, transportation, storage, and disposal of hazardous or toxic materials that may have significant environmental impact.

4.15 DOD 5000 SERIES REQUIREMENTS

In May 2003, changes were made to the DoD 5000 Series acquisition requirements. The new DoD Directive 5000.1 and DoD Instruction 5000.2 allow for a total system approach where acquisition programs are managed to maximize performance and minimize cost. This system includes assessing the prime mission equipment, the personnel who operate and maintain the systems, and the impact on the environment and environmental compliance.

The changes in the new DoD Directive 5000.1 and DoD Instruction 5000.2 directly impacting this LCEA for ER/MP UAVS activities include a heightened awareness of legal and regulatory requirements, Environmental, Safety, and Health (ESH) requirements in program

documentation; integration of ESH issues into the systems engineering process; and advisement of project management staff on mitigative measures available to reduce impacts from hazardous materials in all phases of the project including design, development, test, projection, maintenance support, and eventual disposal.

The UAVS PO will comply with NEPA, with support from the AMCOM G4, by analyzing actions proposed to occur in upcoming program phases that may require NEPA analysis. Any required analysis under NEPA must be completed before the appropriate official may make a decision to proceed with a proposed action that may affect the quality of the human environment.

To minimize the cost and schedule risks changing regulations represent, UAVS PO shall review environmental regulations and shall analyze the regulations and evaluate their impact on the program's cost, schedule, and performance. All safety and health hazards shall be managed consistent with mission requirements and shall be cost-effective. UAVS PO shall ensure that production contractors establish hazardous material management programs requiring appropriate consideration to eliminating and reducing the use of hazardous materials in UAVS PO components. UAVS PO will review the contractors' HMMP that should be designed in accordance with the NAS 411. Its purpose is to ensure that adequate consideration is given to the elimination or reduction of hazardous materials used or generated by the analyzed system, throughout its life-cycle phases. This plan provides a list of hazardous materials used, information on substitutes, subcontractor flow down requirements, and a strategy to eliminate the use of hazardous materials.

The UAVS PO helps to minimize environmental impacts and life-cycle costs associated with environmental compliance through the SIPT and SSWG. These teams identify the systems' impacts on the environment, wastes released to the environment, ESH risks associated with using new technologies, and other information needed to identify source reduction and recycling opportunities. The UAVS PO should also be knowledgeable of the individual contractor's Pollution Prevention Plan responsibilities and requirements such as: reporting releases and transfers of toxic chemicals, making Toxic Release Inventory (TRI) reports available to communities surrounding the facility, and complying with provisions set in section 301 through 312 of the Emergency Planning and Community Right-To-Know Act (EPCRA).

The UAVS PO should ensure, through the AMCOM Safety Office, that safety and health hazards of the various ER/MP UAVS components are evaluated through an established system safety and health program in accordance with Executive Order 12196, *Occupational safety and health Programs for Federal Employees,* and Department of Defense Instruction (DoDI) 6055.1, *DoD Safety and Occupational Health Program.*

5.0 CONCLUSION

Environmental risks from the ER/MP UAVS examined in this document appear to be minor and easily mitigated. It is expected that minor impacts to air quality, biological resources, cultural resources, hazardous materials and waste, health and safety, noise, and geology and soils could potentially occur at facilities where ER/MP UAVS are produced, tested, and/or deployed (Table 5-1). However, no significant environmental issues were determined through this LCEA that indicate a requirement to publish an Environmental Impact Statement (EIS) as required by AR 200-2 and NEPA. No cumulative impacts to the environment were identified and no mitigative measures are necessary for the ER/MP UAVS program.

Table 5-1: Potential Environmental Impacts from the Proposed Action

Environmental Factor	No Impact	No Significant Impact	Significant Impact
Air Quality		X	
Biological Resources		X	
Cultural Resources		X	
Hazardous Materials and Waste		X	
Health and Safety		X	
Infrastructure and Transportation		X	
Land Use	X		
Noise		X	
Geology and Soils		X	
Socioeconomics	X		
Water Resources		X	

Although a detailed review of available literature was accomplished in the preparation of this document, current information on environmental impacts of the ER/MP UAVS, both beneficial and adverse should be periodically reviewed during the remainder of the system's life-cycle and this LCEA should be regularly updated.

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