NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NOTICE: 01-GSFC-02

National Environmental Policy Act (NEPA): Microwave Anisotropy Probe (MAP) Mission

AGENCY: NASA Goddard Space Flight Center

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: Pursuant to the NEPA of 1969, as amended (42 U.S.C. 4321, *et seq.*), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), and NASA policy and procedures (14 CFR Part 1216 Subpart 1216.3), NASA has made a FONSI with respect to the proposed MAP mission. The mission involves the processing of the spacecraft from the Kennedy Space Center (KSC) and launching of the spacecraft from Cape Canaveral Air Force Station (CCAFS), Florida, using a Delta II launch vehicle in June 2001. The primary objective of the MAP Observatory is to measure temperature fluctuations of the cosmic microwave background radiation and produce a high sensitivity and high spatial resolution map of this radiation over the entire sky. The cosmic microwave background radiation is the radiant heat left over from the Big Bang; its properties contain a wealth of information about physical conditions in the early universe. The MAP investigation would help to answer basic cosmological questions relating to the formation of the universe. Because of this, MAP is a key component of NASA's Office of Space Science Structures and Evolution of the Universe Program, whose objective is to answer fundamental questions about the formation of structures in the universe, cycles of matter and energy in the evolution of the universe, and limits of gravity and energy.

DATE: Comments in response to this notice must be provided in writing to NASA within 30 days after publication of this notice.

ADDRESSES: Written comments should be addressed to Ms. Elizabeth Citrin, Goddard Space Flight Center, Code 410.2, Greenbelt, Maryland 20771. The Environmental Assessment (EA) prepared for this mission which supports the FONSI may be viewed at:

(a) NASA Headquarters, Library, Room 1J20, 300 E Street SW, Washington DC 20546 (202-358-0167)
(b) Central Brevard Library and Reference Center, 308 Forrest Avenue, Cocoa, FL 32922

(c) Cocoa Beach Public Library, 550 North Brevard Avenue, Cocoa Beach, FL 32931

(d) Melbourne Public Library, 540 East Fee Avenue, Melbourne, FL 32901

(e) Merritt Island Public Library, 195 North Courtenay Parkway, Merritt Island, FL 32953

(f) NASA, Goddard Space Flight Center, Greenbelt, MD 20771 (301-286-5833

(g) North Brevard Public Library, 2121 South Hopkins Avenue, Titusville, FL 32780

(h) Port St. John Public Library, 6500 Carole Avenue, Cocoa, FL 32927

A limited number of copies of the EA are available on a first request basis by contacting Ms. Elizabeth Citrin at the address or telephone number indicated herein.

FOR FURTHER INFORMATION, CONTACT: Elizabeth Citrin, 301-286-5833, Elizabeth.A.Citrin.1@gsfc.nasa.gov, or Lizabeth Montgomery, 301-286-0469, Lizabeth.R.Montgomery.1@gsfc.nasa.gov.

SUPPLEMENTAL INFORMATION:

NASA has reviewed the EA for the MAP mission and has determined that it represents an adequate and accurate analysis of the scope and level of associated environmental impacts. The EA is hereby incorporated by reference in this FONSI.

NASA proposes to process and launch the MAP satellite into a halo orbit about the L2 Sun-Earth Lagrange point 1.5 million kilometers (930,000 miles) from Earth. Launch and launch processing would occur at KSC and CCAFS in Florida.

The proposed mission and the no-action alternative were examined in the EA. The no-action alternative would preclude gaining important scientific data about the nature of the universe. The no-action alternative would deprive NASA of this opportunity to further the objectives of NASA's OSS SEU program.

The launch vehicle chosen for this mission is the Delta II. Launch vehicle selection for the MAP mission is driven by spacecraft size and mass and desired orbital insertion energy. Other considerations addressed in selection of the launch vehicle include cost and reliability. The combination of launch vehicle and CCAFS launch site would allow MAP to achieve the proper trajectory to deliver MAP to its science observation orbit at the second Sun-Earth Lagrange point, L2.

The environmental consequences of the pre-launch processing and launching of the satellite were considered. The possible environmental impacts that were considered included, but were not limited to, air and water quality impacts, land resources, noise, marine and biotic resources, cultural and historic resources, socioeconomic effects, hazards, and launch debris. The areas of potential impact included those areas involved in the pre-launch processing and launching at KSC and CCAFS. Expected impacts to the human environment arise almost entirely from activities associated with the launch of the Delta II, which would be short term and not substantial. There would be no substantial impact on threatened or endangered species or critical habitat, cultural resources, wetlands, or floodplains. Hazards associated with MAP have been analyzed and do not raise any environmental concerns. The MAP mission would not carry any radioactive materials aboard the spacecraft. No environmental issues of concern were identified. The activities involved with this mission are within the normal scope and level of operations at the site.

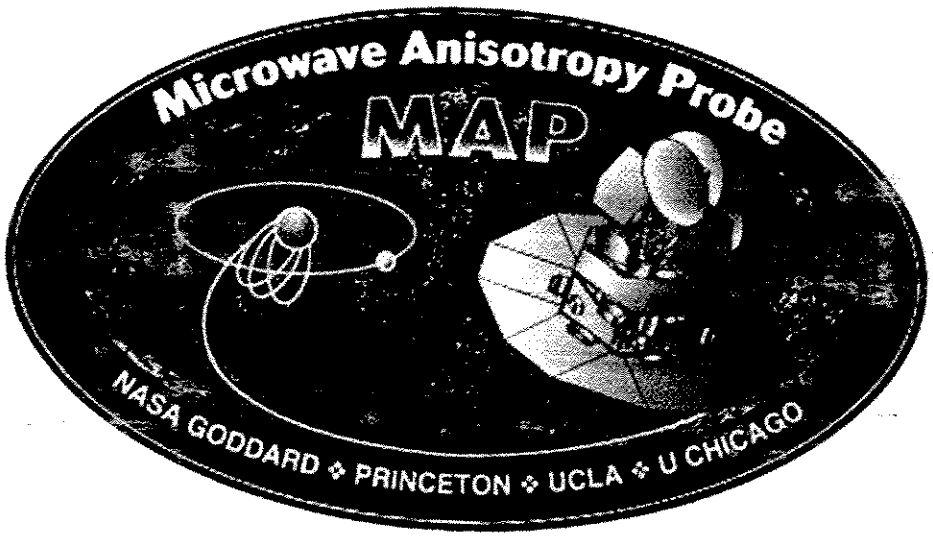
The proposed mission and the No-Action Alternative were examined in this EA. The No-Action Alternative would preclude scientists from gathering important information about the nature and origins of the universe.

On the basis of this MAP Environmental Assessment, NASA has determined that the environmental impacts associated with the mission would not individually or cumulatively have a significant impact on the quality of the human environment.

A.V. Diaz
Director

4/13/01
Date

ENVIRONMENTAL ASSESSMENT FOR THE MICROWAVE ANISOTROPY PROBE (MAP) MISSION



January 2001

National Aeronautics and Space Administration
Explorers Program Office
Goddard Space Flight Center
Greenbelt, Maryland 20771

Environmental Assessment

for the

MAP Mission

Lead Agency:

NASA
Goddard Space Flight Center (GSFC)
Greenbelt, Maryland 20771

Proposed Action:

NASA's Office of Space Science (OSS) is responsible for all of NASA's programs relating to astronomy, the solar system, and the Sun and its interaction with Earth. The objective of the OSS Structure and Evolution of the Universe (SEU) program is to answer the fundamental questions: 1) How did structure in the universe form; 2) What are the cycles of matter and energy in the evolving universe; and 3) What are the ultimate limits of gravity and energy in the universe? The MAP mission is a key component in reaching this objective. NASA proposes to implement the MAP mission, which includes the testing, processing, and launching of this spacecraft (S/C) from Cape Canaveral Air Force Station (CCAFS), Florida.

For Further Information:

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Date:

January 2001

EXECUTIVE SUMMARY

NASA GSFC has determined that an Environmental Assessment (EA) should be prepared in accordance with the National Environmental Policy Act (NEPA) to evaluate the environmental consequences of implementing the MAP mission. This EA discusses the mission's objectives as well as its potential environmental effects. The scope of this assessment includes the testing, transporting, processing, and launching of the S/C.

Both the mission and the No-Action Alternative were examined in this EA. The No-Action Alternative would not fulfill NASA's science needs. No other reasonable action alternative exists that would fulfill the purpose and need.

The environmental consequences of all aspects of the testing, transporting, pre-launch processing, and launch of MAP were considered. Among the possible impacts that were considered are air and water quality impacts, local land area contamination, adverse health and safety impacts, the disturbance of biotic resources, socioeconomic impacts, and adverse effects in wetland areas and areas containing historical sites. All of the activities involved in this mission are within the normal scope and level of activities conducted at the various sites involved. On the basis of this MAP EA, NASA has determined that the environmental impacts associated with the mission would not have a significant impact on the quality of the human environment.

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ABBREVIATIONS AND ACRONYMS

CCAFS	Cape Canaveral Air Force Station
CEQ	Council on Environmental Quality
CMB	Cosmic Microwave Background
EA	Environmental Assessment
ELV	Expendable Launch Vehicle
EMI	Electromagnetic Interference
EOS	Earth Observing System
ERR	Eastern Range Regulation
EWR	Eastern and Western Range
FWS	Fish and Wildlife Service
GSFC	Goddard Space Flight Center
GEMs	Graphite Epoxy Motors
KSC	Kennedy Space Center
MAP	Microwave Anisotropy Probe
MEOP	Maximum Expected Operating Pressure
MIDEX	Medium-Class Explorer
MSPSP	Missile System Pre-Launch Safety Package
MS	Microwave System
NMI	NASA Management Instruction
NMP	New Millenium Program
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
OSS	Office of Space Science
PSP	Project Safety Plan
RF	Radio Frequency
RPM	Revolutions Per Minute
S/C	Spacecraft
SEU	Structure and Evolution of the Universe
TRS	Thermal Reflector System
UCB	University of California, Berkeley

1.0 PROPOSED ACTION AND ALTERNATIVES

1.1 PURPOSE AND NEED FOR PROPOSED ACTION

NASA's OSS is responsible for all of NASA's programs relating to astronomy, the solar system, and the Sun and its interaction with Earth. The objective of the OSS SEU Program is to answer fundamental questions about the formation of structures in the universe, cycles of matter and energy in the evolution of the universe, and the ultimate limits of gravity and energy. The MAP mission is a key component in reaching this objective.

NASA has determined that an EA should be prepared to evaluate the environmental consequences of implementing the MAP mission. The scope of this EA includes the testing, transporting, processing, and launching of the satellite. This document was completed in accordance with the following regulations: the NEPA of 1969, as amended (42 U.S.C. 4321, *et seq.*); the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508); Executive Order 12114, "Environmental Effects Abroad of Major Federal Actions"; and NASA's policy procedures (14 CFR Subpart 1216.3).

1.2 MAP

1.2.1 Mission Description and Science Objectives

MAP is a MIDEX-class mission produced in partnership between GSFC and Princeton University.

The primary objective of the MAP Observatory is to measure temperature fluctuations (anisotropy) and produce a high sensitivity and high spatial resolution (~0.3°) map of the cosmic microwave background (CMB) radiation over the entire sky between 22 and 90 GHz. The CMB radiation is the radiant heat left over from the Big Bang. The properties of the CMB radiation contain a wealth of information about physical conditions in the early universe and a great deal of effort has gone into measuring those properties since its discovery. The CMB radiation (and by extension, the early universe) is remarkably featureless; it has virtually the same temperature in all directions in the sky.

MAP would help to answer three of the most fundamental questions in cosmology:

- What are the values of the cosmological parameters of the Big Bang theory?
- How did structures of galaxies form in the universe?
- When did the first structures of galaxies form?

To answer these questions, MAP must measure the anisotropy of the CMB radiation over the full sky with an angular resolution of at least 0.3 degrees, a sensitivity of 20 uK (micro-Kelvin) per 0.3 degree square pixel, and with systematic effects limited to

5 uK per pixel. MAP would obtain and process differential temperature data, rather than sensing absolute temperatures, to produce a differential temperature map of the sky.

MAP would sense the difference in sky temperatures using two back-to-back optical systems that are followed by a set of 10 differential microwave receivers and associated signal processing electronics. The Observatory would have a compound scan with a spin rate of ~0.454 rpm (revolutions per minute) and a precession rate of ~1 revolution per hour (as shown in Figure 1-1). This allows MAP to collect data over a 45° x 180° swath of the sky every hour while maintaining a stable thermal environment with the instrument shadowed from the microwave inputs of the Sun, Earth and Moon.

The MAP Observatory would assume a Lissajous orbit about the second Sun-Earth Lagrange point, L2, 1.5 million kilometers (930,000 miles) from Earth. This orbit greatly reduces the exposure of the instrument to the systematic error sources that plague ground or near-Earth CMB measurements and allows the use of a passive thermal design to achieve ~95 K receiver temperatures (the reflectors would cool to ~40 K) required to make microwave observations.

The trajectory concept used to deliver the MAP Observatory to L2 is shown in Figure 1-2. Earth-Moon phasing loops with lunar assist are used. The MAP mission duration is 27 months; consisting of 3 months transit time to L2, and 24 months of observing.

1.2.3 Spacecraft Description

The MAP Observatory, shown in Figure 1-3, is essentially made up of the S/C bus and a single instrument. The S/C bus provides the mechanical interface and all of the supporting systems required to support the operation of the instrument. The instrument is made up of the thermal reflector system (TRS) and the microwave system (MS). The TRS consists of two back-to-back optical systems and two radiator panels. The MS houses a set of 10 differential microwave receivers and associated signal processing electronics, which receive the input from the radiometers. The TRS and MS mount to the top of the S/C structure.

The Map Observatory mass is 831 kilograms (1832 pounds). The Observatory is shown in the launch configuration in Figure 1-4. In this configuration (with the solar array panels stowed) the Observatory measures ~361 centimeters (142 inches) in height and ~267 centimeters (105 inches) in width.

Once separated from the third stage, the six solar panels are deployed to provide power for the Observatory, recharge the NiH2 battery, and provide a sun shade for the instrument. This is the on-orbit configuration, as shown in Figure 1-5. Once the arrays are deployed the width of the Observatory grows to ~505 centimeters (199 inches). The array deployment mechanism utilizes a thermal knife to cut through a Kevlar cord, which holds the array panels in place against the S/C during launch.

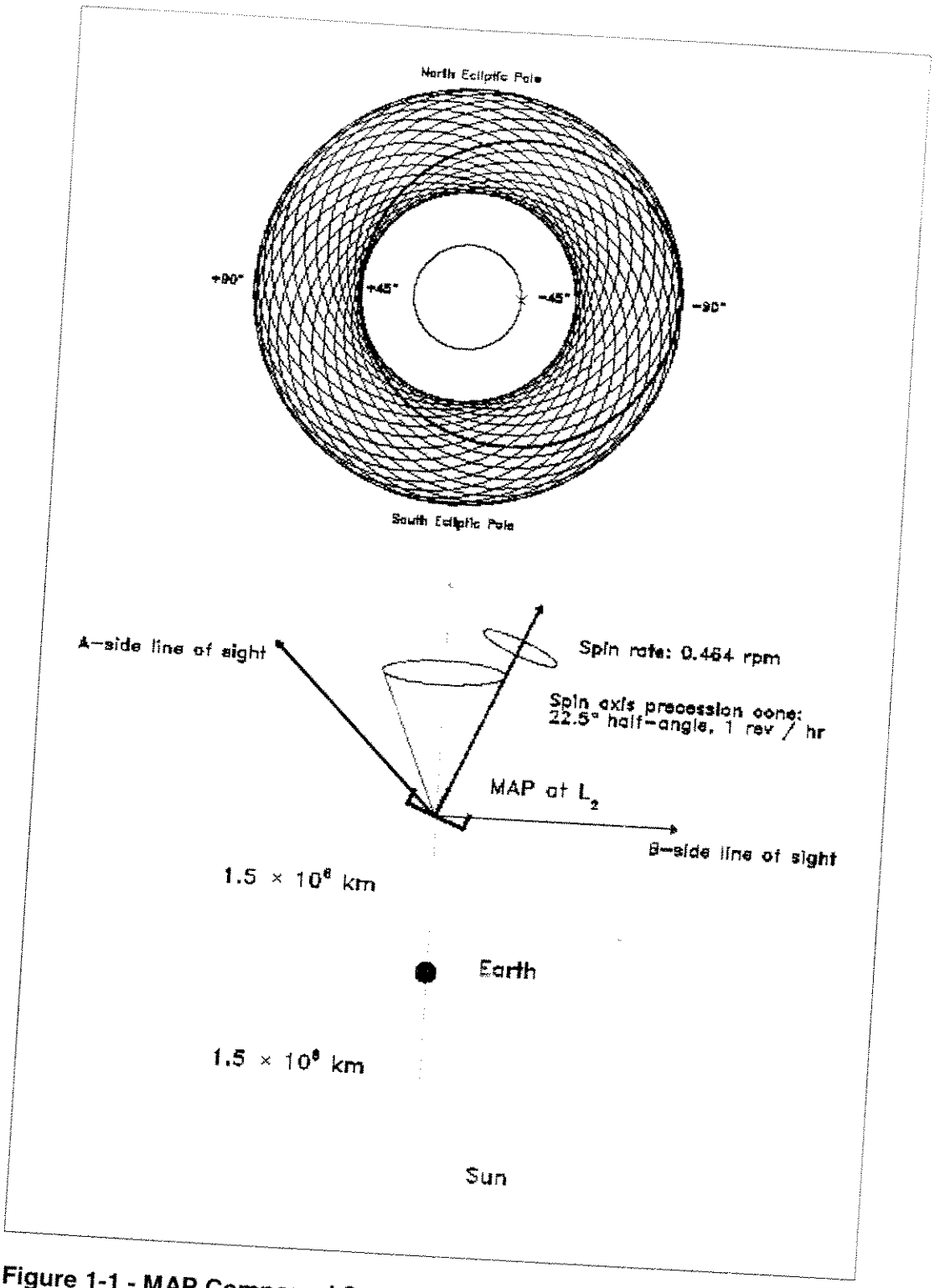

Figure 1-1 - MAP Compound Scan - Spin, Precession & Sky Coverage

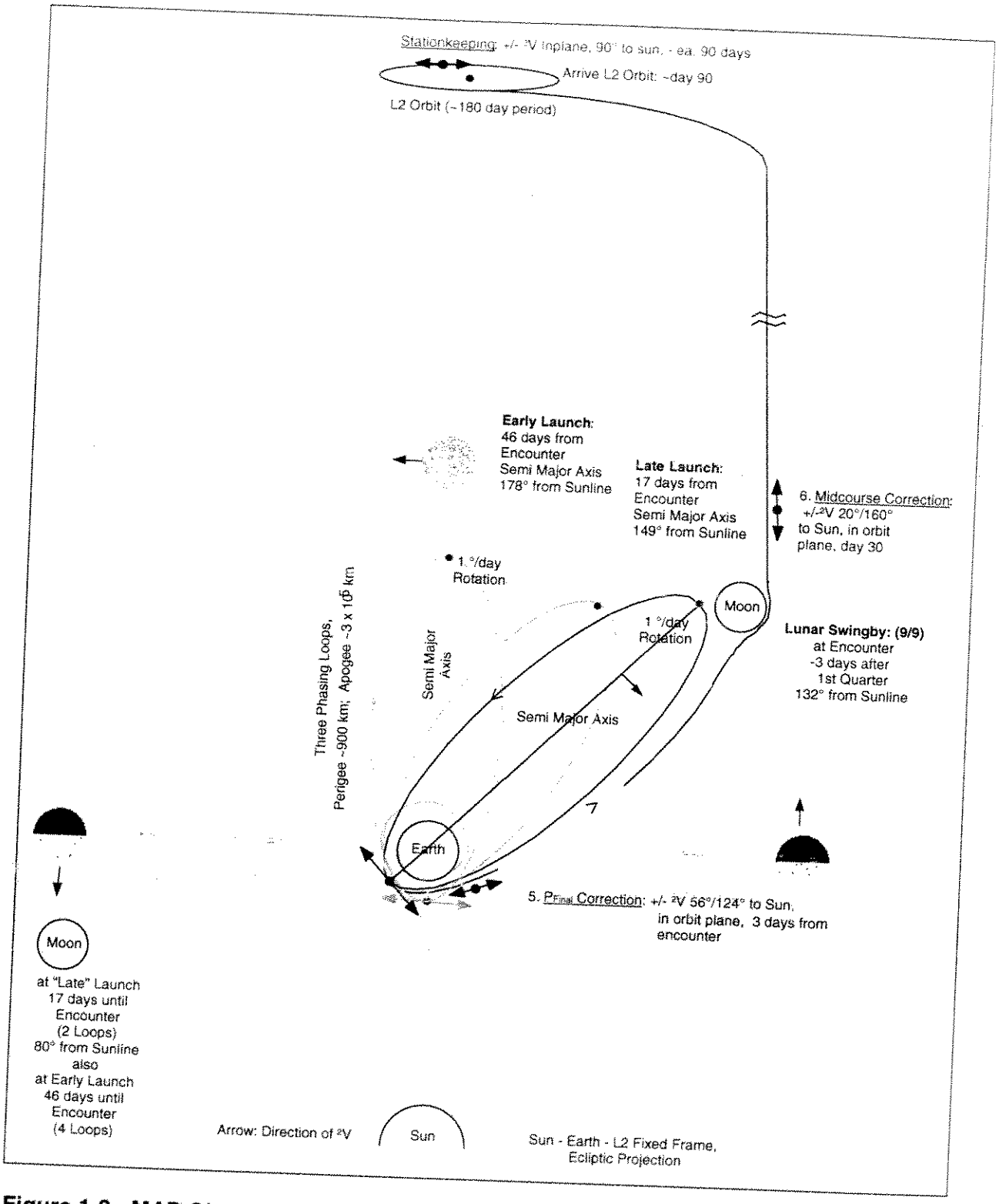

Figure 1-2 - MAP Observatory Trajectory Summary

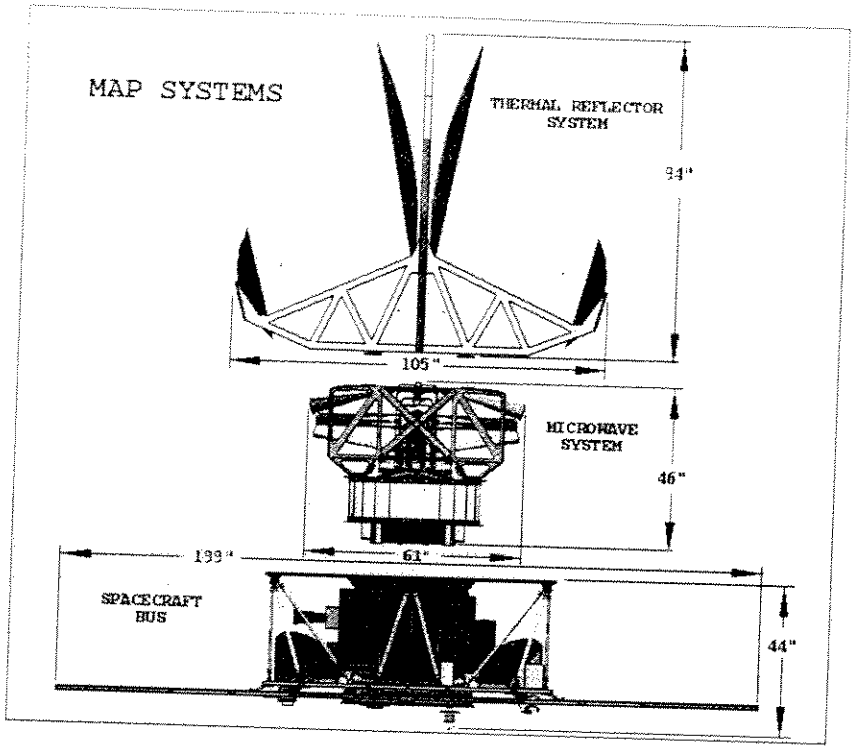

Figure 1-3 - MAP Observatory - Major Systems

1.2.4 Launch Vehicle Description

The MAP S/C mission would utilize a Delta II 7425-10 launch vehicle launched from Space Launch Complex 17 at CCAFS. This vehicle consists of a booster with a Rocketdyne RS-27A main engine augmented by four Alliant Graphite Epoxy Motors (GEMs), a second stage with an Aerojet AJ10-118K (ITIP) engine and a Thiokol Star 48B solid motor third stage. A 10-foot diameter payload fairing encloses the second stage, third stage and S/C during the first stage flight and the early portion of second stage flight. The third stage utilizes a 3712C payload attach fitting with a nutation control system and a yo-yo despin system.

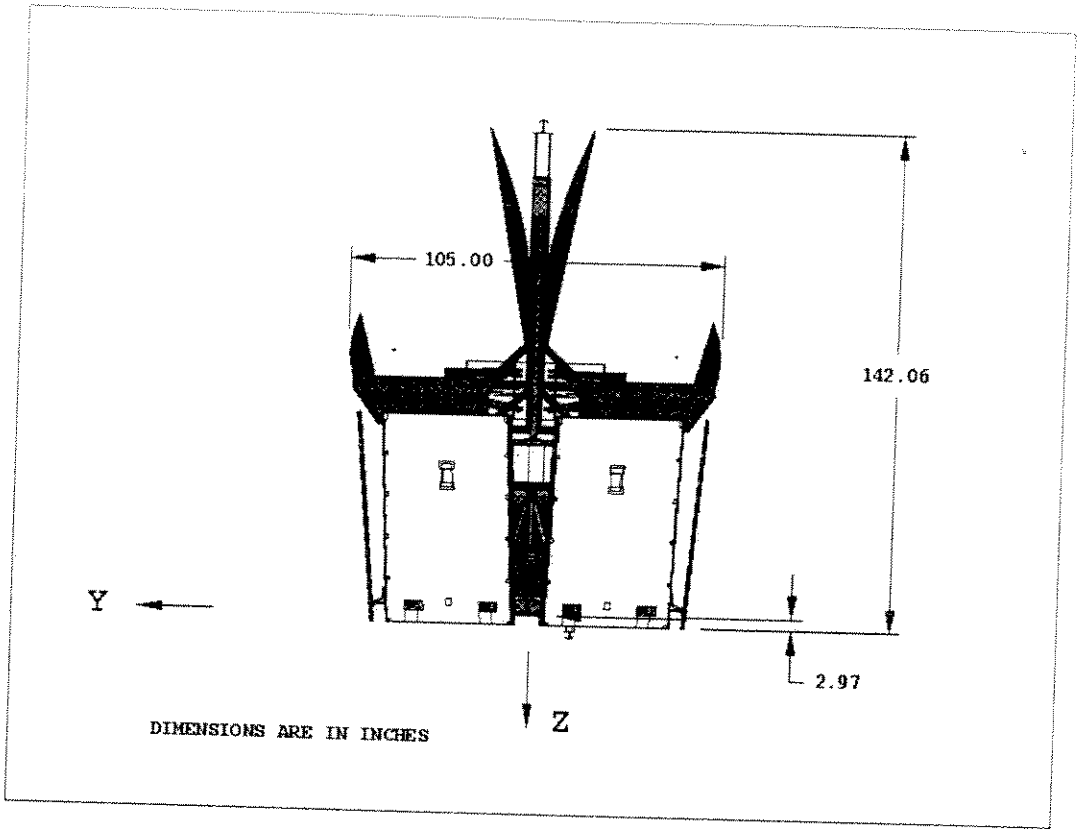

Figure 1-4 - MAP Observatory Launch Configuration

1.3 ALTERNATIVES TO PROPOSED PAYLOAD

The alternatives considered in this assessment were the proposed action and the No-Action Alternative. Under the No-Action Alternative, the MAP mission would not be implemented. This alternative was used as the baseline against which the potential environmental effects of the proposed action were measured.

1.4 ALTERNATIVES TO PROPOSED LAUNCH VEHICLE

Launch vehicle selection for the MAP mission is driven by S/C size and mass and desired orbital insertion energy. Other considerations that were addressed in selection of the launch vehicle include cost and reliability. The MAP strategic mission is also a factor in launch vehicle selection.

The proposed launch vehicle, the Delta II Med-lite Expendable Launch Vehicle, is a reliable and cost-effective alternative to the Space Shuttle. The Delta has been launched over 260 times since 1960. The Delta II 7425 (shown in figure 1-6) is more cost-effective than the larger Delta II 7925, burns less fuel and has less impact on the environment. Less capable launch vehicles would be unable to place the MAP S/C in the desired orbit.

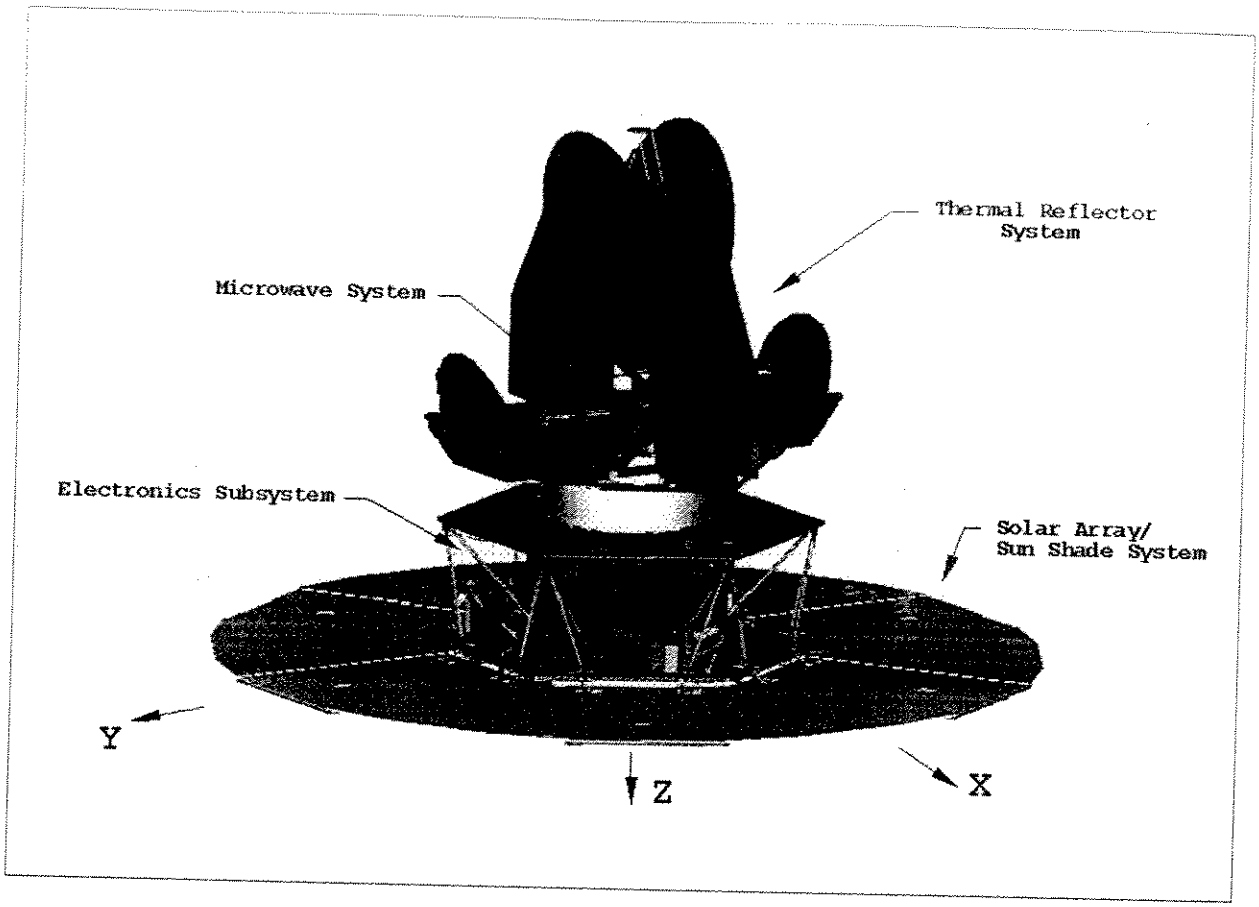

Figure 1-5 - MAP Observatory On-Orbit Configuration

2.0 AFFECTED ENVIRONMENT

2.1 GODDARD SPACE FLIGHT CENTER (GSFC)

GSFC, where MAP is being tested, is located in suburban Maryland, Northeast of Washington, DC. GSFC is a NASA field center encompassing a major U.S. laboratory for developing and operating unmanned scientific S/C. It is also the hub of the Space Agency's communications and data network for manned S/C. The Center manages many of NASA's Earth Observing System (EOS), astronomy and space physics missions. Instrument and S/C testing for MAP are performed in Buildings 7, 10, and 29 at GSFC. The environmental characteristics of GSFC and its surrounding resources have been described thoroughly in GSFC's Environmental Resources Document (NASA 1993a).

2.2 CAPE CANAVERAL AIR FORCE STATION

CCAFS, from which MAP would be launched, is located in Brevard County on the eastern coast of Florida, near the city of Cocoa Beach and 75 km (45 mi.) east of Orlando. The Station occupies nearly 65 km^2 (25 mi^2) of the barrier island that contains

CCAFS, and is adjacent to the NASA Kennedy Space Center (KSC), Merritt Island, Florida. CCAFS is bounded by KSC on the north, the Atlantic Ocean on the east, the city of Cape Canaveral on the south, and the Banana River and KSC/Merritt Island National Wildlife Refuge on the west. Launch operations are the primary activity at CCAFS and KSC. Over 3,000 launches have been conducted at CCAFS and KSC since 1950. Payload processing for the MAP mission would take place in Hanger AE located at CCAFS; S/C fueling, spin balance and third stage mating would take place in SAEF-2 located at KSC; and launch activities would occur on launch pad 17B.

The affected environment of CCAFS and KSC is described in detail in numerous EAs including the New Millennium Program (NMP) programmatic EA (NASA 1998).

3.0 ENVIRONMENTAL IMPACTS OF PROPOSED ACTION AND ALTERNATIVES

3.1 MAP PROPOSED ACTION

The MAP mission is being tested at GSFC from August of 2000 through March 2001 and is scheduled to be shipped in April 2001 to CCAFS for launch processing. The environmental consequences of testing, processing and integration of the MAP mission with its Delta II 7425 expendable launch vehicle (ELV) at CCAFS and KSC are discussed below. Environmental consequences of launching a Delta II expendable launch vehicle has been addressed previously in EOS & NMP EA (e.g. 1997a and 1998).

Testing, processing and launching procedures for the MAP mission are similar to those for NASA's EOS and NMP missions, except that the MAP instrument performs different scientific functions. Thus, the possible impacts of processing, ground processing and launching MAP are consistent with those outlined in the NMP Programmatic EA (NASA 1998) for activities at CCAFS and KSC. The proposed testing and payload processing procedures fall within the normal scope of operations at GSFC and CCAFS. All payload and launch processing procedures at CCAFS and KSC would take place indoors in Hanger AE and SAEF-2 using existing trained personnel. The personnel safety aspects of MAP operations are documented in the MAP Missile System Pre-launch Safety Package (MSPSP).

3.1.1 Air Quality

MAP testing and processing activities at CCAFS and KSC have minor potential air quality impacts associated with them. Testing and processing includes cleaning the instrument with small amounts of volatile solvents. These chemicals would be used indoors under environmentally controlled conditions with adequate ventilation and would not impact the external environment. These activities are within the normal scope of operations at the payload processing facilities.

MAP Configuration Requirements

- Vehicle configuration: 7425-10
- Launch site: SLC-17 at CCAFS
- Launch date: NET 18 April 2001
- Unique mission requirements:
  - 3712C payload attach fitting for MAP
  - Third-stage ballast required
  - Despin with nutation control system
  - Three 24-in. mission-specific access doors (unblanketed)
  - Two 37-pin PAF umbilicals
  - Extended mission modifications
    - Spin table MLI and paint
    - PAF blanket on ordnance panel
  - Blanket on Star-48 motor dome (expected)
  - C-band beacon attenuation (expected)
  - Environmental shroud material changeout
  - Level 500A fairing cleanliness
  - Battery cooling
    - Prior to fairing installation
      - Split off from existing fairing air through access door
    - After fairing installation
      - GPS system
    - Prior to and after fairing installation
      A first-flight GN_2 special spacecraft T-0 battery purge will be used, the first to go across the third-stage PAF/spacecraft interface
  - Purge gas upgrade
  - Remove 60-in^2 air-conditioning vent door

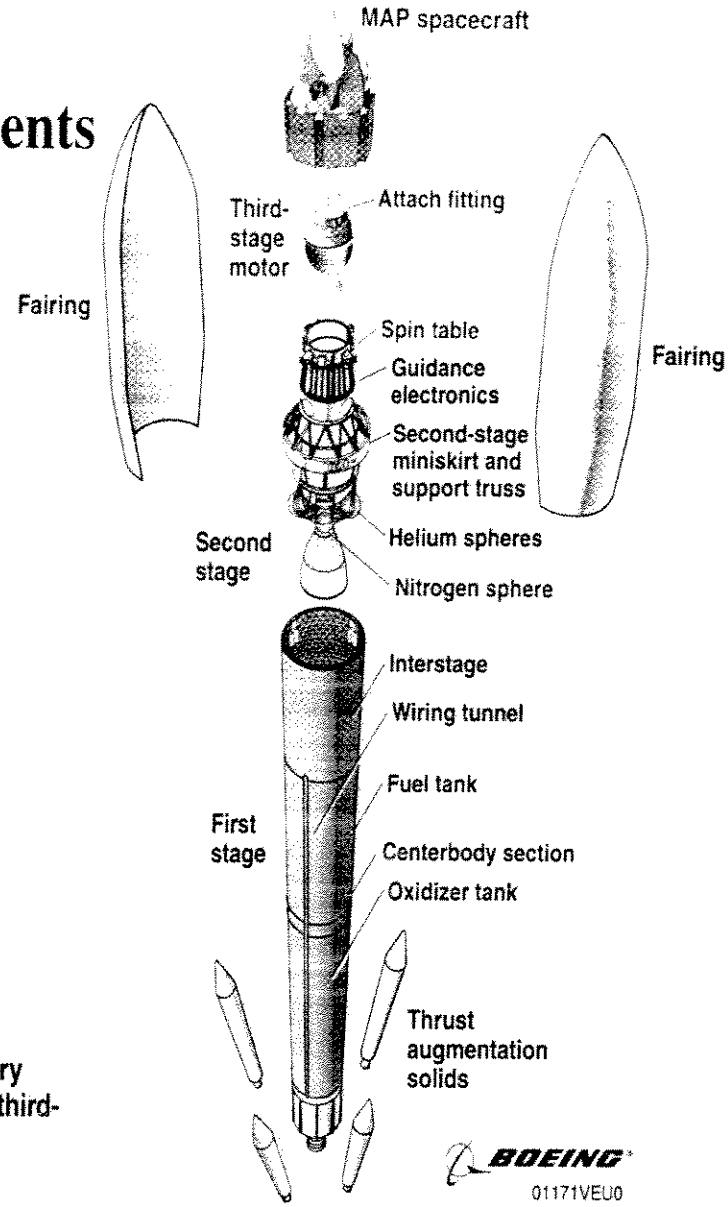

Figure 1-6 - Delta II 7425

3.1.2 Hydrology and Water Quality

Municipal water is used at CCAFS and KSC for payload processing, deluge water (for fire suppression), launch pad wash down, and potable water. Water usage for payload processing fits within the current scope of water discharge permit definitions. Solvents and rinsates generated during processing would be disposed of as hazardous materials in compliance with all existing Federal, applicable State, and local base regulations. It is expected that no more than 3.8 l (one gallon) of each solvent or rinsate would be used to process MAP. No substantial hydrologic or water quality effects are expected from testing or processing of the MAP satellite.

3.1.3 Land Resources

Testing and processing of MAP would take place indoors, in existing facilities, using existing personnel. Testing and processing both fall within the scope of normal activities at CCAFS and KSC. No unique effects on land resources would result from these activities.

3.1.4 Noise

Testing activities at CCAFS and KSC would occur indoors during normal hours of operation. These activities are not anticipated to create noise above and beyond normal operational noises. Likewise, payload processing activities at CCAFS and KSC are well within the normal scope of operations.

3.1.5 Biotic Resources

Normal testing and processing of the MAP Observatory are not expected to cause substantial impacts to terrestrial, wetland or aquatic biota at CCAFS and KSC.

3.1.6 Marine Resources

The potential effects from MAP processing at CCAFS and KSC on the marine environment are considered minimal to nonexistent.

3.1.7 Cultural and Historical Resources

Since no surface or subsurface areas would be disturbed and rocket launches are typical activities at CCAFS and KSC, no archeological, historic or cultural sites listed or eligible for listing in the National Register of Historic Places are expected to be affected by the testing, processing or launching of MAP.

3.1.8 Socioeconomic Effects and Environmental Justice

Testing, processing and launching activities would take place using existing personnel, away from residential areas. No jobs would be created or re-located during these activities. There are no substantial socioeconomic effects resulting from the MAP mission. Executive Order 12898, Federal Actions to Address Environmental Justice In Minority Populations and Low-income Populations, directs Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their activities on low-income populations or minority populations in the United States. The MAP mission does not raise any environmental justice concerns. The MAP Project is small in size and scope and would not produce any substantial environmental or human health impacts. Therefore, there would be no disproportionately high or adverse impacts on minority or low-income populations from the implementation of the MAP mission.

3.1.9 Hazards

The MAP Observatory presents routine hazards which are discussed below.

Hazardous materials present on the S/C are listed in Table 3-1.

Table 3-1 - S/C Hazardous Chemicals/Materials

Substance	Quantity	Use	MSDS	Hazard
Potassium Hydroxide (KOH)	N/A	battery electrolyte	Yes	Corrosive
Gallium Arsenide (GaAs)	N/A	solar cells	N/A	arsenic is a poison
Ceria	N/A	Borosilicate glass solar cell covers	N/A	Low degree of hazards in a powdered state. Mild eye irritant, chronic inhalation exposure is bronchitis
Hydrazine	160 lbs	S/C fuel	Yes (D-11)	Flammable/combustible, carcinogenic, toxic, corrosive

The batteries consist of 11 NiH2 common pressure vessels. Each vessel contains two cells, each containing a 31% solution of KOH as the electrolyte. The electrolyte is absorbed into the internal plates and separator material such that there is no free or spillable KOH. The cells are vacuum filled. The KOH electrolyte is a caustic material which can cause severe burns. If the electrolyte gets onto the skin or eyes, the area must be flushed with copious amounts of water. Medical assistance must be obtained. KOH is incompatible with water, acids, flammable liquids, organic halogens, and some metals. When not installed on the S/C, the batteries would be stored in a battery box and moved/handled using approved procedures, minimizing any contact with these materials. The battery cell casings exceed safety requirements. The cells have a MEOP (Maximum Expected Operating Pressure) of 900 PSI, with a burst pressure safety factor > 3:1. Leakage of the electrolyte during normal ground operations is not probable. The Nickel-Hydrogen battery would be installed in the MAP S/C bus. The battery would be shipped in a discharged condition. Upon arrival at KSC, the S/C would be thoroughly inspected for damage and functional testing would augment visual inspection.

The propulsion system tank would be loaded with 59.7 kilograms (160 pounds) of hydrazine at KSC. Fueling would be performed by KSC personnel with a KSC-supplied fueling cart. The fuel would be supplied, stored and sampled by KSC. Personnel would wear propellant handlers ensemble during the fueling operation. All materials used in the propulsion subsystem have demonstrated long-term stability and compatibility with the propellant agent hydrazine.

The solar cells contain arsenic. The total amount of arsenic contained in the gallium arsenide compound in the arrays is ~4.5 grams (.14 ounces). The density of arsenic in the arrays is the same as that in the majority of S/C's now launched. The cells are covered with a coverglass and are not accessible by personnel.

Safe hardware and support equipment would be used to ensure safety for both personnel and equipment during all phases of testing and operation. A Missile System Pre-launch Safety Package (MSPSP) has been prepared in accordance with NASA-GSFC, NASA-KSC and the Air Force Eastern Range Safety Office requirements. The MSPSP documents MAP satellite compliance with the requirements established by the Eastern and Western Range Regulations, EWR 127-1 dated 31 March 1995 as tailored for MAP, July 1997. This document also serves to demonstrate that requirements and procedures are met to obtain flight and ground payload safety approval.

Cleaning materials and other processing materials would be used in Hanger AE in a well-ventilated area. Application of some of the processing materials is for contingency use only. This would include the solar array repair kit chemicals and solothane. These potential hazards are enumerated in the MSPSP. All hazardous wastes generated at CCAFS are managed according to the 4th Space Wing Petroleum Products and Hazardous Waste Management Plan (Plan 19-14). Hazardous wastes produced during processing and launching operations would be collected and stored in hazardous waste accumulation areas before being transferred to a hazardous storage area. These wastes would eventually be transported to an off-station licensed hazardous waste treatment/disposal facility.

While potential health and environmental hazards connected to the MAP mission exist, a number of safety mechanisms are in place to minimize risks. All potentially hazardous activities at GSFC, KSC and CCAFS have been documented and hazard reduction addressed. The procedures are within the scope of normal activities at both GSFC, KSC and CCAFS and meet all NASA safety requirements. No significant environmental consequences are associated with these activities.

3.1.10 Launch Failures

Launch from the Delta II ELV is within the scope of normal operations at CCAFS. The environmental consequences of a Delta II failure has been addressed in several environmental documents, including the EOS and NMP EA documents (NASA 1997 and NASA 1998)

3.1.11 Orbital Debris

NASA Policy Directive (NPD) 8710.3, "Policy to Limit Orbital Debris Generation," states that "NASA's policy is to employ design and operations practices that limit the generation of orbital debris, consistent with mission requirements and cost-effectiveness." Orbital debris is a NEPA issue only as to its potential impact upon returning to Earth. The general guideline for orbital debris returning to Earth is that the total "footprint" of objects impacting the Earth's surface may not exceed 8 m^2 (86 ft^2). The NPD requires that each program or project conduct a formal assessment for the potential to generate orbital debris. A debris assessment for the MAP mission was approved by NASA-Headquarters in December 1999. The launch and operation of the MAP satellite satisfies the conditions of NASA's policy objectives. The MAP orbit is at the L2 Sun-Earth Lagrange point and MAP would not return to Earth at the end of life.

3.2 MAP POLLUTION PREVENTION

Executive Order 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements," pledges the Federal Government to prevent pollution at the source and commits the government to comply with the Emergency Planning and Community Right to Know Act (EPCRA) and Pollution Prevention Act (PPA).

NASA, as an agency, is complying with Executive Order 12856. NASA has achieved a 50% reduction in releases of toxic chemicals to the environment and off-site transfers for treatment and disposal. NASA centers have established chemical inventory databases for use in management and reporting of the chemicals. Each center performs toxic release inventory reporting and emergency planning and notification reporting to the local authorities. Each center also submits annual Pollution Prevention Progress. The NASA centers work to identify and implement pollution prevention opportunities through source and waste reduction and new technologies.

In implementing the MAP mission, NASA would comply with Toxic Release Inventory Reporting requirements, Emergency Planning and Community Right-to-Know responsibilities, and State and Local Right-to-Know and Pollution Prevention requirements. NASA would support the Local Emergency Planning Committee as requested and would make available all Pollution Prevention and Community Right-to-Know information upon request (NPG 8820.3 – March 1999). The MAP mission would be managed in compliance with both NASA and USAF requirements and objectives for pollution prevention.

The MAP mission, during S/C processing, would not use, create, accumulate, or store any significant amounts of toxic, corrosive, flammable, reactive, or irritant hazardous material waste requiring special collection/disposal methods. Reactive solvents, thinners, and reducers have been eliminated from MAP processing. The cleaning at S/C level uses only deionized water and isopropanol alcohol.

3.3 NO ACTION ALTERNATIVE

3.3.2 MAP

Although the absence of launching operations related to MAP might spare the environment surrounding CCAFS LC-17 of potential environmental impacts, the launch of a single satellite is within the scope of existing operations at CCAFS and would have limited impact on the surrounding environment. In addition, cancellation of the mission would preclude scientists and taxpayers from gaining important information concerning the nature of the universe.

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