National Aeronautics and
Space Administration
Goddard Space Flight Center
Greenbelt, MD 20771

November 8, 2002

Reply to Attn of: 454

MEMORANDUM FOR THE RECORD

NEPA Compliance for Tracking and Data Relay Satellite (TDRS) J

1.0 Introduction

The National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 et seq.), requires federal agencies to consider the environmental impacts of a project in their decision making process. To comply with NEPA and associated regulations (the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508) and NASA policy and procedures (14 CFR Part 12160)), NASA has prepared an Environmental Assessment (EA) for routine payloads launched on Expendable Launch Vehicles (ELV's) from Cape Canaveral Air Force Station (CCAFS) and Vandenberg Air Force Base (VAFB) (Ref: Final Environmental Assessment for Launch of NASA Routine Payloads on Expendable Launch Vehicles from Cape Canaveral Air Force Station, Florida and Vandenberg Air Force Base, California, June 2002). The EA assesses the environmental impacts of missions launched from CCAFS and VAFB with spacecraft that are considered routine payloads.

Spacecraft defined as routine payloads would utilize materials, quantities of materials, launch vehicles and operational characteristics that are consistent with normal and routine spacecraft preparation and flight activities at VAFB, CCAFS, and Kennedy Space Center. The environmental impacts of launching routine payloads from VAFB and CCAFS fall within the range of routine, ongoing and previously documented impacts that have been determined not to be significant. Spacecraft covered by this EA meet specific criteria ensuring that the spacecraft, its operation and decommissioning do not present any new or substantial environmental or safety concerns.

To determine the applicability of a routine payload classification for a mission launched from VAFB and CCAFS and coverage under the NASA routine payload EA, the mission is evaluated against the criteria defined in the EA using the Routine Payload Checklist (RPC).

2.0 Mission Description

TDRS-J is part of the TDRS Replenishment Program. The objective of the Replenishment Program (Spacecraft TDRS H, I, J) is to provide follow-on spacecraft required to maintain and expand the Space Network by replacing the current constellation of geosynchronous TDRS satellites as they begin to exceed their lifetimes in the late 1990's.

The current TDRS System (TDRSS) consists of seven (7) in-orbit telecommunications satellites, associated ground stations, and customer and data handling facilities. This system of satellites and ground stations comprises the TDRS portion of the Space Network that provides mission services for near Earth user satellites and orbiting vehicles. The system provides global communication and data relay services for the Space Shuttle, International Space Station, orbiting satellites, balloons and research aircraft.

Since the late 1950's NASA's method for providing data communications from orbiting satellites consisted of a network of powerful antennas at ground stations located around the world. The major disadvantage to this system was that the time available to communicate with the orbiting satellites as they passed overhead was very limited. As the number of satellites placed into orbit increased, researchers determined that a series of geo-stationary satellites could provide nearly continuous tracking and data transfer capabilities. The idea for a global system of communication satellites was developed through the 1970's and culminated with the launch of TDRS-1 in 1983. Following the loss of TDRS-2 in the Challenger accident in 1986, five (5) more TDRS satellites were launched over the next nine (9) years to provide the global coverage NASA provides today. TDRS-H (now known as TDRS-8), the first of the Replenishment Spacecraft, was launched in 2000, followed by the launch of TDRS-I in 2002.

Operating the TDRS satellites at fixed positions 22,300 miles high above the Earth in a geosynchronous orbit, the TDRSS constellation provides the broadest coverage to all users including research aircraft and launch vehicles. With its unique capability to view and track expendable launch vehicles, TDRSS has proven to be a viable, inexpensive alternative to traditional ground station or aircraft support for data acquisition during liftoff and other critical periods of communication. The TDRSS has been a test platform for a plethora of research trials such as radio-frequency propagation, very-long-base interferometry, digital radio broadcasting, telemedicine and aircraft satellite communications, which serve to advance civilian mobile and military communications. As the system ages, using residual assets has proved fruitful. For instance, the TDRS-1 satellite supports research efforts conducted at the South Pole by the National Science Foundation.

TDRS-J will be launched on an ATLAS-IIA launch vehicle from CCAFS in late 2002. The TDRS-J spacecraft is based on the body-stabilized Boeing 601 satellite. The electrical power, attitude determination and control, and tracking, telemetry and control units are mounted on the bus structure, as are the solar array wings. The

spacecraft is 21 meters long (68 ft. 10 in.) with solar wings deployed and 13 meters wide (43 ft. 5 in.) with antennas deployed. It weighs 3,190 kg (7,033 lbs), which includes 1,676 kg (3,695 lbs) of expendable fuel. The spacecraft lifetime is 11 years, operational, plus up to 4 years of on-orbit storage. The onboard communications payload provides Ka, Ku & S-Band telecommunication services.

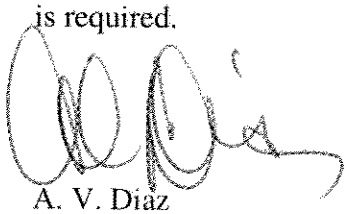
The propulsion and reaction control system is a bi-propellant system using monomethyl hydrazine fuel and nitrogen tetroxide oxidizer. The attitude control system is a momentum bias design, using a gimbaled momentum wheel for active three-axis torquing and momentum storage. A system of heat pipes, multi-layer insulation, radiators and thermostatic heater control, provide autonomous thermal control for all deployed operations. Two wings covered with silicon solar cells provide a 15-year end of life power of approximately 2300 watts. Nickel hydrogen batteries, which supply power during eclipses, have autonomous battery charge maintenance.

The functional and technical performance requirements for the replenishment satellites is virtually identical to those of the current satellites except for improved multiple access and S-band single access performance, the addition of Ka-band, and spacecraft collocation.

The components utilized in the TDRS-J spacecraft and equipment are made of materials normally encountered in the space industry. TDRS-J does not use any radioactive materials or lasers. TDRS-J does not carry any pathogenic organisms, nor will TDRS-J return samples to Earth.

3.0 NASA Routine Payload Determination

The TDRS-J mission has been evaluated against the NASA routine payload EA for launches from CCAFS and VAFB, using the RPC (see enclosed Evaluation Recommendation Package). The evaluation indicates that the mission meets the criteria for a routine payload. The mission does not present any unique or unusual circumstances that could result in new or substantial environmental impacts. Based on this review, it is determined that the TDRS-J mission qualifies as a routine payload and falls within the scope of the reference routine payload EA. No additional NEPA action or documentation is required.



A. V. Diaz

Enclosure

EVALUATION RECOMMENDATION PACKAGE

Record of Environmental Consideration
Routine Payload Checklist
NEPA Environmental Checklist

Enclosure

RECORD OF ENVIRONMENTAL CONSIDERATION

1. Project Name: **Tracking and Data Relay Satellite (TDRS) J**

2. Description/location of proposed action:
The purpose of the TDRS replenishment program is to provide tracking and data relay spacecraft to replenish NASA's Space Network. TDRS-J is to be launched on a Atlas-IIA from CCAFS.

Date and/or Duration of project: Launch – Fall 2002

3. It has been determined that the above action:

X a. Is adequately covered in an existing EA or EIS.
Title: *Final Environmental Assessment for Launch of NASA Routine Payloads on ELVs from CCAFS, Florida and VAFB, California*
Date: June 2002

___ b. Qualifies for Categorical Exclusion and has no special circumstances which would suggest a need for and Environmental Assessment.
Categorical Exclusion: _____

___ c. Is exempt from NEPA requirements under the provisions of:

___ d. Is covered under EO 12114, not NEPA.

___ e. Has no significant environmental impacts as indicated by the results of an environmental checklist and/or detailed environmental analysis.
(Attach checklist or analysis as applicable)

___ f. Will require the preparation of an Environmental Assessment.

___ g. Will require the preparation of an Environmental Impact Statement.

___ h. Is not federalized sufficiently to qualify as a major federal action.

Bob Nelson
NEPA Coordinator, Code 205.2 — Date 10/29/02

Robert W. Kamilakis
Project Manager, Code 454 — Date 10/29/2002

NASA Routine Payload Checklist (1 of 2)

PROJECT NAME: **Tracking and Data Relay Satellite Flight J** DATE OF LAUNCH: November 20, 2002

PROJECT CONTACT: Mike Goeser PHONE NUMBER: 301-286-0427 MAILSTOP: Code 454

PROJECT START DATE: July 1995 PROJECT LOCATION: GSFC Code 454, Building 12, Room C004

PROJECT DESCRIPTION: Third of a series of three new NASA Tracking and Data Relay Communication Satellites

	YES	NO
A. SAMPLE RETURN:		
1. Would the candidate mission return a sample from an extraterrestrial body?		X
B. RADIOACTIVE SOURCES:	YES	NO
1. Would the candidate spacecraft carry radioactive materials?		X
2. If Yes, would the amount of radioactive sources require launch approval at the NASA Associate Administrator level or higher according to NPG 8715.3 (NASA Safety Manual)?		
Provide a copy of the Radioactive Materials Report as per NPG 8715.3 Section 5.5.2.		
C. LAUNCH AND LAUNCH VEHICLES:	YES	NO
1. Would the candidate spacecraft be launched using a launch vehicle/launch complex combination other than those indicated in Table 1 below?		X
2. Would the proposed mission cause the annual launch rate for a particular launch vehicle to exceed the launch rate approved or permitted for the affected launch site?		X
Comments:		
D. FACILITIES:	YES	NO
1. Would the candidate mission require the construction of any new facilities or substantial modification of existing facilities?		X
2. If Yes, has the facility to be modified been listed as eligible or listed as historically significant?		
Provide a brief description of the construction or modification required:		
E. HEALTH AND SAFETY:	YES	NO
1. Would the candidate spacecraft utilize any hazardous propellants, batteries, ordnance, radio frequency transmitter power, or other subsystem components in quantities or levels exceeding the Envelope Payload characteristics (EPCs) in Table 2 below?		X
2. Would the candidate spacecraft utilize any potentially hazardous material as part of a flight system whose type or amount precludes acquisition of the necessary permits prior to its use or is not included within the definition of the Envelope Payload (EP)?		X
3. Would the candidate mission release material other than propulsion system exhaust or inert gases into the Earth's atmosphere or space?		X
4. Would launch of the candidate spacecraft suggest the potential for any substantial impact on public health and safety?		X
5. Would the candidate spacecraft utilize a laser system that does not meet the requirements for safe operation (ANSI Z136.1-2000 and ANSI Z136.6-2000)? For Class III-B and IV laser operations, provide a copy of the hazard evaluation and written safety precautions (NPG 8715.3).		X
6. Would the candidate spacecraft contain pathogenic microorganisms (including bacteria, protozoa, and viruses) which can produce disease or toxins hazardous to human health?		X
Comments:		

continued on next page

NASA Routine Payload Checklist (2 of 2)

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F. OTHER ENVIRONMENTAL ISSUES:	YES	NO
1. Would the candidate spacecraft have the potential for substantial effects on the environment outside the United States?		x
2. Would launch and operation of the candidate spacecraft have the potential to create substantial public controversy related to environmental issues?		x
Comments:		

Table 1: Launch Vehicles and Launch Pads

Launch Vehicle	Eastern Range (CCAFS Launch Complexes)	Western Range (VAFB Space Launch Complexes)
Atlas IIA & AS	LC-36	SLC-3
Atlas IIIA & B	LC-36	SLC-3
Atlas V Family	LC-41	SLC-3
Delta II Family	LC-17	SLC-2
Delta III	LC-17	N/A
Delta IV Family	LC-37	SLC-6
Athena I & II	LC-46 or -20	California Spaceport
Taurus	LC-46 0r -20	SLC-576E
Titan II	N/A	SLC-4W
Pegasus XL	CCAFS skidstrip KSC SLF	VAFB airfield

Table 2: Summary of Envelope Spacecraft Subsystems and Envelope Payload Characteristics (EPC)

Structure	**Unlimited:** aluminum, magnesium, carbon resin composites, and titanium **Limited:** beryllium [50 kg (110 lb)]
Propulsion	Mono- and bipropellant fuel; 1000 kg (2200 lb) (hydrazine); 1000 kg (2200 lb) (monomethyhydrazine) Bipropellant oxidizer; 1200 kg (2640 lb) (nitrogen tetroxide) Ion-electric fuel; 500 kg (1100 lb) (Xenon) SRM; 600 kg (1320 lb) (AP)-based solid propellant
Communications	Various 10-100 W (RF) transmitters
Power	Solar cells; 150 A-Hr ($Ni-H_2$) battery; 300 A-Hr (LiSOC) battery; 150 A-Hr (NiCd) battery
Science instruments	10 kW radar ANSI safe lasers (Section 4.1.2.1.3)
Other	Class C EEDs for mechanical systems deployment Radioisotopes limited to quantities that are approved for launch by NASA Nuclear Flight Safety Assurance Manager Propulsion system exhaust and inert gas venting

NEPA Environmental Checklist

1. Project/Program

Tracking and Data Relay Satellites (TDRS) I and J

2. Points of Contact

Project Manager: Robert W. Jenkens, Sr. **Code:** 454 **Telephone:** 6-8520
Deputy Project Manager: Edward T. Lowe **Code:** 454 **Telephone:** 6-6664

3. Schedule

Formulation Phase (Phase A/B): Complete
Implementation Process (Phase C/D): Complete
Launch Date: TDRS-I, October 29, 2001, TDRS-J, October 2002.
Other Milestone Dates: On-Orbit Checkout TDRS-I, 10/29/01 – 1/14/02 and TDRS-J, 10/02 – 1/03.

4. Current Status

Pre-Ship Readiness Reviews.

5. Project Description

Purpose: Provide 3 tracking and data relay spacecraft and corresponding ground station modifications to replenish NASA's Space Network.

Spacecraft/Instruments: Single Access and Multiple Access Telecommunication Electronic equipment and antennas.

Launch Vehicle: Atlas-IIA

Launch Site: Launch Pad 36, Cape Canaveral, Florida

Participants/Locations: NASA/Goddard Space Flight Center, Greenbelt, MD; Boeing Satellite Systems, El Segundo, CA; NASA/Kennedy Space Center, FL; Lockheed Martin Commercial Launch Services, Boulder, CO.

Mission Life: 11 years service life, 4 years on-orbit storage, and 15 years consumables.

End-Of-Mission, Re-entry: At the end of the mission, the TDRS-I and J satellites will retire at a super synchronous orbit.

6. Is there anything controversial about the mission:

No – Nothing controversial about the spacecraft design. The only items of question are the following: liquid Bi propellants (2,291.3 lbs. Nitrogen Tetroxide Ozidizer and 1,388.6 lbs. Monomethyl Hydrazine Fuel) pyrotech deployment initiators; and 29 cell nickel hydrogen batteries. It is thus considered a benign payload.

7. **Is there anything unique, unusual, exotic about the mission, spacecraft, and instruments?**
None, similar function to an on-going mission.

8. **Is there any environmental (NEPA) documentation for spacecraft launch vehicle?**
EAs have been completed for the launch vehicle (Atlas IIA)

9. **Does the Mission include or involve:** Specific to Spacecraft, as of shipping from Boeing, CA to KSC, FL and launch.

Yes	a. Fuels (see paragraph 6)
No	b. Radioactive Material
Yes	c. Explosives (see paragraph 6)
No	d. Chemicals
No	e. Hazardous Materials/Substances
No	f. Lasers (Class, Earth Pointing)
No	g. Disease Producing Pathogenic Microorganisms
No	h. Construction of a New Facility
No	i. Discharges of any substances into air, water, or soil
No	j. Generation/Use/Storage/Disposal of Toxic or Hazardous Substances
No	k. Generation of Hazardous Wastes
No	l. Generation of High Noise Levels
No	m. Sample Return to Earth
No	n. Generation of Ionizing or Nonionizing Radiation
No	o. Impact on Local Social or Economic Conditions
No	p. Removal of Vegetation or Destruction of Habitat
No	q. Impact/Affect on Minority or Low Income Populations
No	r. Affect any threatened or endangered species
No	s. Affect Areas of historical or cultural significance
No	t. New or foreign launch vehicle
No	u. Other issues of potential environmental impact

10. **Has an Air Force Form 813 been completed?** (Please attach copy)
In Progress.

Robert W. Lambert Code 454 — 8/6/2001

Project Manager, Code — **Date**