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

July 28, 2003

Reply to Attn of: 427

MEMORANDUM FOR THE RECORD

National Environmental Policy Act (NEPA) Compliance for Canadian Small Scientific Satellite (SCISAT-1) Atmospheric Chemistry Experiment (ACE)

1.0 Introduction

The 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 Parts 1500-1508] and NASA policy and procedures [14 CFR Part 1216 Subpart 1216.3]), 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 the 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

The SCISAT-1 mission is a Canadian Space Agency mission which will fly an Atmospheric Chemistry Experiment (ACE) on board a Canadian Small Scientific Satellite (SCISAT-1). NASA is providing engineering support, the launch vehicle, and associated services. The SCISAT spacecraft will be launched by an air-launched Pegasus XL booster from VAFB, in the 3rd Quarter, 2003.

Anthropogenic changes in atmospheric ozone are increasing the amount of ultraviolet radiation received at northern mid-latitudes and in the Arctic, and may affect the climate. The principal objective of the mission is to measure and to understand the chemical and dynamical processes that control the distribution of ozone in the upper troposphere and stratosphere. The focus will be on one important and serious aspect of the atmospheric ozone problem - the decline of stratospheric ozone at northern mid-latitudes and in the Arctic. Specifically, the mission is to perform measurements whose data will be able to:

- Assess the complex environmental effects of chemicals. (Example: ozone)
- Understand the processes that control concentrations of chemicals. (Example: mechanisms for ozone depletion in mid-latitudes.)
- Quantify the export of pollution from individual countries and source regions. Example: movement of pollutants between Canada, US and Mexico, between Japan and China.
- Monitor the success of environmental policies. (Example: evaluate success of international agreements on chlorofluorocarbon (CFC) phase-out.)
  Discover the unexpected. Past examples: discovery of an Antarctic ozone hole, large-scale pollution from tropical biomass burning.

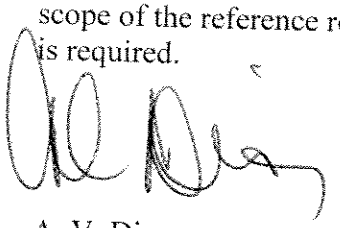
The spacecraft weighs 152.3 kilograms (335.8 lbs), and measures 100 centimeters (39.37 inches) in height and 112 centimeters (44.1 inches) in diameter. Electrical power to the spacecraft and instruments will be provided by triple-junction solar cells on a body mounted array and a lithium-ion battery.

The SCISAT instruments are the Fourier Transform Spectrometer (ACE-FTS) and the Measurement of Aerosol Extinction in the Stratosphere and Troposphere Retrieved by Occultation (MAESTRO). FTS is the primary instrument on board the spacecraft and the MAESTRO instrument will augment the science obtained from the FTS.

The components utilized in the SCISAT spacecraft and instruments are made of materials normally encountered in the space industry. SCISAT does not carry any radioactive materials or lasers. SCISAT does not carry any pathogenic organisms, nor will SCISAT return samples to Earth. Components/materials/hazards associated with SCISAT do not raise any environmental or health concerns. The Canadian Space Agency has carried out an analysis that confirms that the SCISAT spacecraft meets the international standards for orbital debris assessments. The spacecraft contains no deployable items and will burn up totally on reentry.

3.0 NASA Routine Payload Determination

The SCISAT 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 SCISAT 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

cc:
400/Ms. D. Perkins
420/Mr. G. Morrow
420/Mr. W. Schiavone
427/Mr. W. Ochs

EVALUATION RECOMMENDATION PACKAGE

Record of Environmental Consideration
Routine Payload Checklist
NEPA Environmental Checklist

Enclosure

RECORD OF ENVIRONMENTAL CONSIDERATION

1. Project Name: **SCISAT-1, Atmospheric Chemistry Experiment**

2. Description/location of proposed action:
The SCISAT-1 mission consists of a Canadian Space Agency satellite flown on a NASA launch vehicle. NASA is to provide engineering support and the launch vehicle and associated services. The s/c is to be launched on a Pegasus XL from VAFB.

Date and/or Duration of project: Launch 3rd Q 03

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.

Beth Montgomery
NEPA Coordinator, Code 250 — 7/16/03 Date

Project Manager, Code 427 — 7/17/03 Date

NASA Routine Payload Checklist (1 of 2)

PROJECT NAME: **SCISAT-1 Atmospheric Chemistry Exp.** DATE OF LAUNCH: 1/19/03

PROJECT CONTACT: Bill Ochs PHONE NUMBER: 301-286-2875 MAILSTOP: 426/7

PROJECT START DATE: 12/00 PROJECT LOCATION: NASA responsibilities managed from GSFC

PROJECT DESCRIPTION: Measure and understand processes which control distribution of ozone,

A. SAMPLE RETURN:	YES	NO
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)

PROJECT NAME: **SCISAT-1 Atmospheric Chemistry Exp.** DATE OF LAUNCH: 1/19/03

PROJECT CONTACT: Bill Ochs PHONE NUMBER: 301-286-2875 MAILSTOP: 426.7

PROJECT START DATE: 12/00 PROJECT LOCATION: NASA responsibilities managed from GSFC

PROJECT DESCRIPTION: Measure and understand processes which control distribution of ozone.

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

SCISAT-1 Atmospheric Chemistry Experiment (CSA satellite flown on a NASA launch vehicle)

2. Points of Contact

Project Manager: Bill Ochs Code: 427 Telephone: x67277
S/C Manager: _____ Code: _____ Telephone: _____
Instrument Manager: _____ Code: _____ Telephone: _____
Other: _____ Code: _____ Telephone: _____

3. Schedule

Formulation Process (Phase A/B): Completed
Implementation Process (Phase C/D): Phase D in process
Launch Date: 1/19/03
Other Milestone Dates: _____

4. Current status

The SCISAT bus has been shipped to David Florida Labs in Ottawa for instrument integration, environmental testing, and pre-launch testing.

5. Project Description

Purpose: To measure and understand the chemical and dynamic processes that control the distribution of ozone in the upper troposphere and stratosphere.
Spacecraft/Instruments: Fourier Transform Spectrometer (FTS), Measurement of Aerosol Extinction in the Stratosphere and Troposphere Retrieved by Occultation (MAESTRO)
Launch Vehicle: Pegasus XL
Launch Site: Vandenburg
Participants/Locations: CSA, Bristol Aerospace, EMS Technologies, ABB Bomem, GSFC, KSC, Orbital Sciences Corporation Launch Services Group
Mission Life: 2 years
End of mission, Re-entry: The s/c will reenter relying on atmospheric drag to cause the gradual decay of the orbit.

6. Is there anything controversial about the mission?

No

7. Is there anything unique, unusual, exotic about the mission, spacecraft, and instruments?

No

8. Is there any environmental (NEPA) documentation for spacecraft, launch vehicle?

An environmental impact assessment was performed for Pegasus at VAFB which applies to KSC.CCAFS. The document is entitled "Environmental Assessment for the Orbital Science Corp. Commercial Launch Services Program at VAFB, California, dated 21 December 1992. Additional NEPA documentation includes the EOS Program Environmental Assessment.

9. Does the mission include or involve:

Check all that apply. If uncertain indicate with a "?"
For all that apply provide an explanation. Use the additional page if needed.

x a. Fuels Only on the L/V
____ b. Radioactive Material
____ c. Explosives
____ d. Chemicals
____ e. Hazardous Materials/Substances
____ f. Lasers (Class, Earth Pointing)
____ g. Disease Producing Pathogenic Microorganisms
____ h. Construction of a New Facility
____ i. Discharges of any substances into air, water, or soil
____ j. Generation/Use/Storage/Disposal of Toxic or Hazardous Substances
____ k. Generation of Hazardous Wastes
____ l. Generation of High Noise Levels
____ m. Sample Return to Earth
____ n. Generation of Ionizing or Nonionizing Radiation
____ o. Impact on Local Social or Economic Conditions
____ p. Removal of Vegetation or Destruction of Habitat
____ q. Impact/Affect on Minority or Low Income Populations
____ r. Affect Any Threatened or Endangered Species
____ s. Affect Areas of Historical or Cultural Significance
____ t. New or Foreign Launch Vehicle
____ t. Other Issues of Potential Environmental Impact

10. Has an Air Force Form 813 been completed? (Please attached copy)

No

Project Manager, Code 427

7-12-03
Date

Explanations for Question 9.

Additional Information:

NASA's responsibilities for SCISAT-1 is to provide engineering support when requested by the Canadians and to provide the launch vehicle and associated services.

Summary of SCISAT-1 ACE Subsystems

Structural Materials	Machined aluminum alloy primary structure, titanium alloy flexures, and, aluminum honeycomb core and facesheets on solar array
Propulsion	None
Communications	5W S-band transmitter, QPSK modulation
Power	Triple-junction solar cells on body mounted array 13.5 A-hr Li-Ion battery
Science instruments	(ACE FTS) Fourier transform spectrometer with cryo-cooled InSb and Hg/Cd/Te detectors and VIS/NIR imagers (MAESTRO) UV/VIS spectrometer
Other (include dimensions and weight of s/c)	Spacecraft size: 112 cm dia x 100cm tall Spacecraft mass 152.3 kg One HOP actuator for release of rotary arm in ACE FTS instrument on-orbit No EED's.