

RECORD OF ENVIRONMENTAL CONSIDERATION

PROJECT NAME: ARCTAS Mission

1. Description and location of proposed action:

The purpose of the ARCTAS mission is to enhance the value of NASA satellite observations for Earth science models. The mission will be flown on the WFF P-3B in conjunction with multiple multi-agency aircraft representing U.S. NASA, NOAA, DOD, and Canadian agencies. The P-3 will carry 8 science instruments and two data transfer systems. P-3B flights will be based from Yellowknife, Canada, Fairbanks, Alaska, and Thule, Greenland.

Date and/or Duration of project: April 2008 and June-July 2008

2. It has been determined that the above action (choose one)

a. Is adequately covered in an existing EA or EIS.

Title: _____

Date: _____

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

Categorical Exclusion: 4.2.1 a (2)

(NASA, NPR 8580.1, Chapter 4)

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

d. 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)

e. Will require the preparation of an Environmental Assessment.

f. Will require the preparation of an Environmental Impact Statement.

NEPA Program Manager, Code 250

Date

Project Manager, Code 840

Date

NEPA Environmental Checklist (R&D Projects)

Project Name: ARCTAS Mission Date: March 28, 2008
Project Contact: David Easmunt Project Start Date: April 2008
Building Number and Location: D-1, room N219 Phone Number: 757-824-1376
Description of Project: See attached sheet

Environmental Impacts:

"Yes" responses may require the project to prepare an Environmental Assessment or conduct additional studies.

A. Geologic:

- a. Greater than 10% change in topography or ground surface relief features? Yes [] Maybe [] No [X]
b. Any increase in wind or water erosion of soils, either on or off site? Yes [] Maybe [] No [X]
c. Changes in deposition, situation, or erosion that may modify the wetlands or bay? Yes [] Maybe [] No [X]

Explain all "yes" and "maybe" answers: _____

B. Air:

- a. Substantial air emissions or deterioration of ambient air quality? Yes [] Maybe [] No [X]
b. The creation of objectionable odors? Yes [] Maybe [] No [X]
c. Alteration of air movement, moisture, temperature, or any changes in climate, either locally or regionally? Yes [] Maybe [] No [X]

Explain all "yes" and "maybe" answers: _____

C. Water:

- a. Disturbance of groundwater? Yes [] Maybe [] No [X]
b. Greater than 10% changes in absorption rates, drainage patterns, or the rate and amount of surface runoff? Yes [] Maybe [] No [X]
c. Alter the course or flow of floodwaters? Yes [] Maybe [] No [X]
d. Alteration of the direction or rate of ground water? Yes [] Maybe [] No [X]
e. Change in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations? Yes [] Maybe [] No [X]
f. Activities resulting in changes of greater than 10% of Center total potable water use (maximum 820,000 gallons/month)? Yes [] Maybe [] No [X]
g. Any construction or other activity in a floodplain or wetland? Yes [] Maybe [] No [X]

Explain all "yes" and "maybe" answers: _____

D. Cultural Resources:

- a. Is the project located in an historic district or affects an existing landmark? Yes [] Maybe [] No [X]
b. Will the project alter a building that is 50 years or older? Yes [] Maybe [] No [X]
c. Is the project located in an area of suspected archaeological resources? Yes [] Maybe [] No [X]

Explain all "yes" and "maybe" answers: _____

E. Biological Resources:

- a. Construction/grading/filling within or adjacent to designated wetlands? Yes [] Maybe [] No [X]
b. Reduction of the numbers of any rare, or endangered species? Yes [] Maybe [] No [X]
c. Construction/grading/filling within open space or grasslands areas? Yes [] Maybe [] No [X]
d. Introduction of new species or plants into an area, or impacts the normal replenishment of existing species? Yes [] Maybe [] No [X]
e. Proposed construction activities in piping plover habitat? Yes [] Maybe [] No [X]
f. Proposed construction activities within 600 feet of an eagle's nest? Yes [] Maybe [] No [X]
g. Propose new landscaping or modify existing landscaping? Yes [] Maybe [] No [X]

Explain all "yes" and "maybe" answers: _____

F. Noise:

- a. A noise increase greater than 10% from an existing operation? Yes [] Maybe [] No [X]
b. Exposure of people to severe noise levels (above 80 dBA)? Yes [X] Maybe [] No []
c. Increase existing CNEL noise contours surrounding the airfield? Yes [] Maybe [] No [X]

Explain all "yes" and "maybe" answers: Only at take-off and landing. Hearing protection required on airfield.

G. Land Use:

- a. Substantial alteration of the present or planned land use? Yes [] Maybe [] No [X]
- b. Increase in the rate of use of any natural resource? Yes [] Maybe [] No [X]
- c. Activities resulting in changes of greater than 10% of Center energy consumption (1,800,000 KWH of Main Base energy, 2,175,000 KWH of launch area energy, or 4,250,000 KWH of total energy)? Yes [] Maybe [] No [X]
- d. Activities resulting in a change in total employment levels greater than 10% (more than 95 people)? Yes [] Maybe [] No [X]

Explain all "yes" and "maybe" answers: _____

H. Health and Safety:

- a. Generation of ionizing or non-ionizing radiation? Yes [X] Maybe [] No []
- b. Generate any air emissions? Yes [] Maybe [] No [X]
- c. Use of pesticides, including insecticides, herbicides, fungicides or rodenticides? Yes [] Maybe [] No [X]
- d. Confined space entry? Yes [] Maybe [] No [X]
- e. Risk of exposure to asbestos or lead containing materials? Yes [] Maybe [] No [X]
- f. Result in the exposure or disturbance of contaminated soil or ground water? Yes [] Maybe [] No [X]
- g. Generate industrial wastewater or storm water discharge? Yes [] Maybe [] No [X]
- h. Use of Class I ozone-depleting substances (CFC's, TCA, halons)? Yes [] Maybe [] No [X]
- i. Acquisition, use, or storage of any toxic or hazardous substance? Yes [X] Maybe [] No []
- j. Generation of medical (biohazard), hazardous, toxic, or radiological wastes? Yes [] Maybe [] No [X]
- k. Use, disturbance, or disposal of PCBs? Yes [] Maybe [] No [X]
- l. Use of toxic gas? Yes [] Maybe [] No [X]

Explain all "yes" or "maybe" answers: HERO and HERP analyses have been performed for REVEAL instrument and determined that its transmitter is safe; two small radioactive sources will be employed as part of the HIGEAR (Po-210) and CCN (Kr-85) instruments. Sources are generally licensed and commercially available. Lasers will be employed on HIGEAR, CCN, and COBALT instruments, however all will be contained within the respective instruments. All hazardous materials use will be in accordance with the project's approved Ground Safety Plan.

I. Transportation/Circulation:

- a. Generation of substantial vehicle trips (over 620 per day)? Yes [] Maybe [] No [X]
- b. Affect existing parking facilities or demand for new parking? Yes [] Maybe [] No [X]
- c. Substantial impact upon existing transportation systems? Yes [] Maybe [] No [X]
- d. Increase in traffic hazards to motor vehicles, bicyclists, or pedestrians? Yes [] Maybe [] No [X]

Explain all "yes" and "maybe" answers: _____

J. Services:

- a. Affect or result in need for new or altered government-provided fire protection services? Yes [] Maybe [] No [X]
- b. Affect or result in need for new or altered government-provided security services? Yes [] Maybe [] No [X]

Explain all "yes" and "maybe" answers: _____

K. Environmental Justice:

- a. Does the project have the potential to disproportionately affect low-income populations or minority populations? Yes [] Maybe [] No [X]

Explain all "yes" and "maybe" answers: _____

OVERVIEW OF THE ARCTAS MISSION

1.1 INTRODUCTION:

The ARCTAS mission will be flown on the WFF P-3B in conjunction with multiple aircraft representing U.S. NASA, NOAA, DOD, and Canadian agencies. The P-3 will carry 8 science instruments and two data transfer systems. P-3B flights will be based from Yellowknife, Canada, Fairbanks, Alaska, and Thule, Greenland.

ARCTAS will take place as two 3-week aircraft deployments, in April 2008 and June-July 2008. The mission will be part of the International Polar Year IPY/POLARCAT arctic field program for atmospheric composition, which involves a consortium of countries (United States, Canada, Germany, France, Norway, Russia) and U.S. agencies (National Science Foundation, NOAA, and DOE), and an ensemble of aircraft, surface, and ship-based measurement platforms. This document addresses the NASA Wallops Flight Facility P-3B portion of the ARCTAS mission.

1.2 OBJECTIVES

The overall design of ARCTAS is to enhance the value of NASA satellite observations for Earth science models. In doing so, ARCTAS will build on previous U.S. aircraft missions to the Arctic including the NASA ABLE-3 and SOLVE missions and the NSF TOPSE mission. The spring deployment will target anthropogenic pollution including arctic haze, stratosphere-troposphere exchange, and sunrise photochemistry including halogen radicals. The summer deployment will target boreal forest fires, stratosphere-troposphere exchange, and summertime photochemistry. The eight science instruments and two data transfer systems that will be flown onboard the P-3 are listed below:

- Ames Airborne Tracking (AATS-14)
- Aerosol Optical Package Experiment (AERO3X)
- Broadband Radiometers (BBR)
- Cloud Absorption Radiometer (CAR)
- Cloud Condensation Nuclei (CCN)
- CO by Attenuated Laser Transmission (COBALT)
- Hawaii Group for Environmental Aerosol Research (HIGEAR)
- Project Data System (PDS)
- Research Environment for Vehicle Embedded Analysis on Linux (REVEAL)
- Solar Spectral Flux Radiometer (SSFR)

1.3 ENVIRONMENTAL CONSIDERATIONS

The ARCTAS mission contains items identified in the project environmental checklist that require further explanation. They are discussed below:

AATS-14, AERO3X, BBR, CAR, PDS, REVEAL, and SSFR are all passive electronic systems and pose no hazards to the aircraft and/or crew. The transmitter on the REVEAL instrument is not powerful enough to pose a threat to personnel or ordnance. Hazards of

Electromagnetic Radiation to Ordnance (HERO) and Hazards of Electromagnetic Radiation to Personnel (HERP) calculations were performed for REVEAL and it was determined to be HERO and HERP safe. Neither of the remaining experiments has a transmitter. The PDS and the HIGEAR have prior flight history on the P-3B. The COBALT and HIGEAR instruments have flown on another NASA aircraft, the DC-8. All other instruments are new installations to NASA/WFF aircraft.

1.3.1 RADIOACTIVE SOURCES

1.3.1.1 HIGEAR

A radioactive source (Polonium-210) will be flown onboard the aircraft as part of the HIGEAR instrument. The Polonium-210 ion source is a generally licensed, commercial, anti-static device and is designed for use on compressed air lines in clean rooms. The type of radiation emitted is alpha particles which do not penetrate an inch of air at atmospheric pressure and are effectively shielded by a piece of notebook paper. Thus the source is well protected by its aluminum casing. In the HIGEAR system two of these anti-static devices will be employed; they will be mounted in a sealed metal holder that is part of the instrument sample line.

1.3.1.2 CCN

A radioactive source (Krypton-85) will be flown onboard the aircraft as part of the CCN instrument. The Krypton-85 gas is typically encapsulated in welded titanium capsules with a 0.0025 – 0.0051 cm thick window. This Krypton-85 source is generally licensed and commercially available. It is designed to neutralize airborne/aerosol charged particles. It is sealed in a 4" x Ø1" stainless steel tube. This tube is inserted into the CCN instrument, whereupon it opens to neutralize charged particles inside the instrument. It is then closed before being withdrawn, such that no particles or radiation are released.

1.3.2 LASERS

HIGEAR, CCN, and COBALT employ lasers, however all beams are contained within each respective instrument. As such, neither a Federal Aviation Administration letter of non-objection nor a Laser Safety Clearinghouse Site Window is required. The laser containment "boxes" of the instruments will remain closed during the mission to ensure that no beams will be fired into the aircraft cabin.

1.3.3 CRYOGENICS

The COBALT instrument cryogenic system includes three liquefied nitrogen (LN₂) dewars. The largest, a 35 liter storage dewar, has been inspected and certified by ManTech International Corporation, of Wallops Island. It will be strapped securely to a pallet behind the experimenter, as flown previously on the DC-8. A 4 liter hand held transfer dewar will be used only when the aircraft is at full stop on the ground. Personal Protective Equipment worn during transfer will include an apron, full face shield and cryogenic gloves. LN₂ will be transferred thus to a 1L dewar housed inside the instrument. This dewar is vented, but otherwise unexposed to the cabin crew.

1.4 CONCLUSIONS

WFF's support of the ARCTAS mission has been evaluated in accordance with NEPA through the attached NEPA Environmental Checklist for Research and Development Projects. The impacts from the ARCTAS mission are not considered substantial but are likely to be minor and transient.

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