RESEARCH/MANAGEMENT STUDY PROPOSAL

Ft. Niobrara-Valentine National Wildlife Refuge Complex
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Study of Water Vapor, Carbon Dioxide and Methane Fluxes in Mid-Latitude Prairie Wetlands

Research to be Conducted at the Dewey Lake Area

Submitted by Shashi B. Verma, Professor
Department of Agricultural Meteorology
University of Nebraska, Lincoln Nebraska

Date of Submission: May 27, 1993

Title — Study of Water Vapor, Carbon Dioxide and Methane Fluxes in Mid-Latitude Prairie Wetlands

Project #

Objectives — Our overall objective is to expand the currently limited body of knowledge on surface fluxes of water vapor, carbon dioxide and methane in mid-latitude prairie wetlands. The proposed research program is targeted toward improving the understanding of biogeochemical and biophysical factors regulating methane emission and carbon dioxide exchange rates. In order to accomplish this objective, it is necessary to measure surface fluxes of methane, carbon dioxide and energy, and a suite of physical, chemical and biological variables.

Justification — This study will provide urgently needed information on carbon dioxide, methane and energy fluxes from mid-latitude wetlands. This information will help improve prediction of future climatic conditions.

National Institute of Global Change

Procedures

Methods and Materials

The fluxes of water vapor, carbon dioxide, and methane will be measured with micrometeorological instruments mounted on a mast and located 4 meters above the surface. The mast will be installed on a platform (see enclosed schematic diagrams 1 and 2). This platform will be installed by a construction contractor. The platform and mast will be removed upon completion of this project.

The fluxes of carbon dioxide and methane will also be measured at different locations using portable chambers. Boardwalk will be installed to facilitate these measurements.

Variables such as solar radiation, air temperature, humidity, wind speed and soil temperature will also be monitored.

3-5 people each day 45KW Generator

A portable diesel generator will be used to provide power for the instruments. Our equipment trailer, which houses data logging systems, will be installed at the edge of the fen. A portable toilet will be used at the site.

Results and Interpretation

Anticipated results include the magnitude of fluxes of water vapor, carbon dioxide, and methane through the growing season. Information on factors controlling these factors will also be developed.

Cooperators — T.J. Arkebauer, Assistant Professor, Department of Agronomy, University of Nebraska, Lincoln, Nebraska

F.G. Ullman, Professor, Department of Electrical Engineering and Center for Laser-Analytical Studies of Trace Gas Dynamics, University of Nebraska, Lincoln, Nebraska

D.S. Schimel, Scientist III, National Center for Atmospheric Research, Boulder, Colorado

E.A. Holland, Scientist I, National Center for Atmospheric Research, Boulder, Colorado

D.W. Valentine, Research Associate, Natural Resources Ecology Laboratory, Colorado State University, Fort Collins, Colorado

Construction contractor, TBA: to install platform

Responsibility — Shashi B Verma, Professor, Department of Agricultural Meteorology, University of Nebraska, Lincoln, Nebraska; PHONE (402) 472-6702 or 472-3679; FAX (402) 472-6614

Cost — No cost will be incurred by the Fish and Wildlife Service.

Schedule — We would like to install the walkways and platforms in about a week and would like to start measurements soon after this installation. These measurements will be made from the summer through early fall of 1993 and from spring through early fall of 1994.

Reports — Copies of reports will be provided, if desired.

Publications — Copies of publications will be provided, if desired.

Submitted By: Shashi B. Verma Date: May 27, 1993

Shashi B. Verma, Professor
Department of Agricultural Meteorology
University of Nebraska-Lincoln

Endorsement: Blaine L Blad Date: May 27, 1993

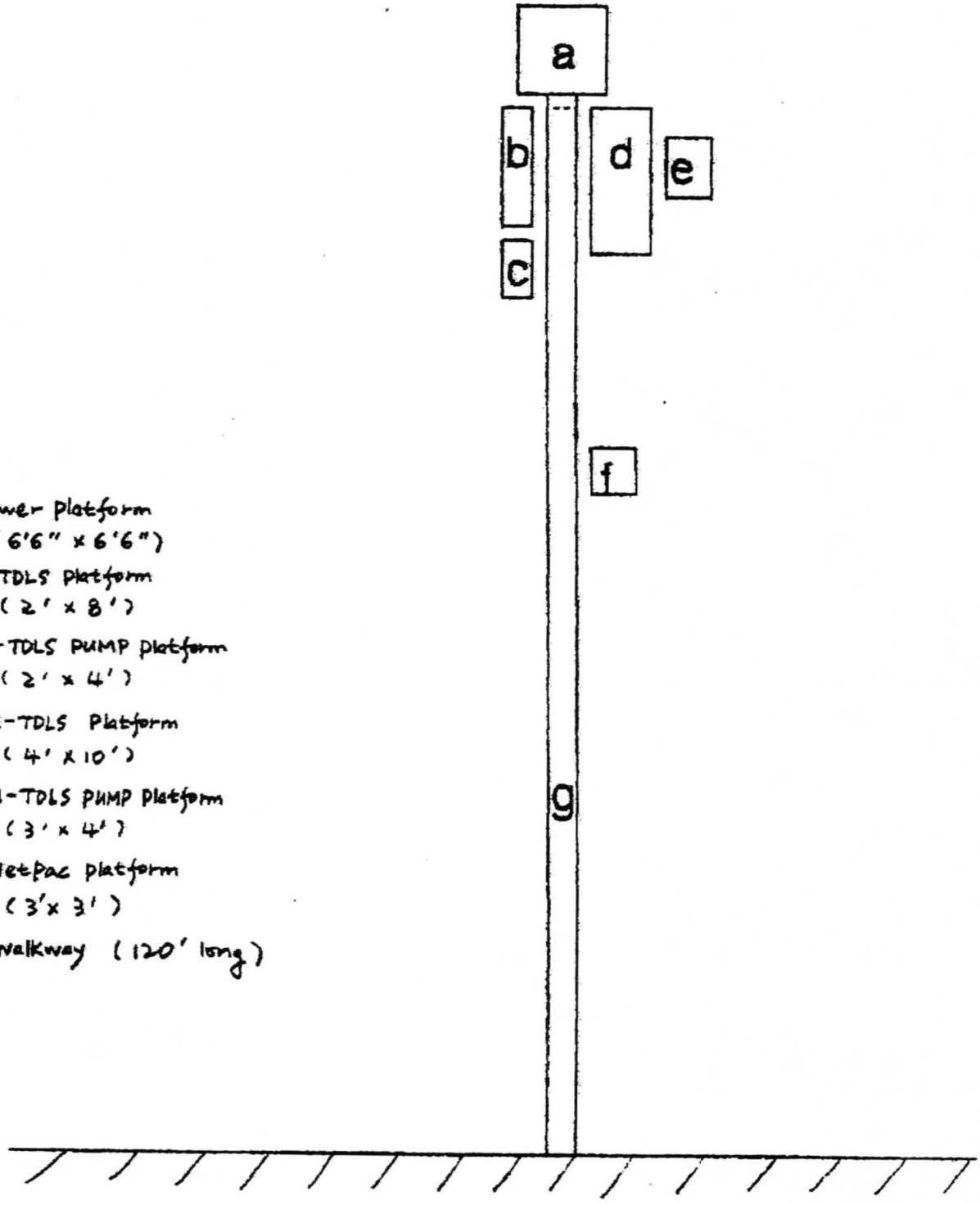
Blaine L. Blad, Head
Department of Agricultural Meteorology
University of Nebraska-Lincoln

Refuge Manager Approval:_____ Date:_____

Regional Office Concurrence/Approval:_____

Date:_____

Diagram #1



a: Tower platform
(6'6" x 6'6")

b: C-TDLS platform
(2' x 8')

c: C-TDLS PUMP platform
(2' x 4')

d: U-TDLS Platform
(4' x 10')

e: U-TDLS PUMP Platform
(3' x 4')

f: Netpac platform
(3'x 3')

g: Walkway (120' long)

Platform Construction and Walkway cross section

Diagram #2