

**APPLICATION FOR POLLUTION RECOVERY FUND ASSISTANCE**

**DATE OF APPLICATION:** May 1, 2006

**A. BASIC ASSISTANCE**

1. Applicant: The legal name of the applicant/organization, the organizational unit and the complete mailing address of the applicant.

Name: Dr. Noreen D. Poor  
Organization: University of South Florida College of Public Health  
Address: 13201 Bruce B. Downs Blvd, Tampa, FL 33612

2. Project Manager Information: Give name and title of the representative of the applicant who will be the Environmental Protection Commission's principle contact concerning this application

Name Dr. Noreen D. Poor  
Title Associate Professor, USF College of Public Health  
Address 13201 Bruce B. Downs Blvd, Tampa, FL 33612  
Phone Number 813-974-8144; 813-974-4986 (FAX)  
Project Title Nitrogen Emission/Deposition Ratios for Air Pollution Sources That Contribute to the Nitrogen Loading of Tampa Bay  
Project Time Start: September 1, 2006 End: August 31, 2007  
Total Cost of Project \$ 40,906  
Total EPC share requested \$ 40,906

REC'D  
MAY 01 2006  
ENV. PROT. COMM  
OF H.C.

3. Assistance Type: **New or Renewal** (check one)

New - Award of funds for initial request within the project period.

Renewal - Award of funds for a project beyond the current project period.

4. Project Location:

The proposed effort requires that nitrogen atmospheric concentrations and deposition rates be calculated for the Tampa Bay Estuary watershed and for Tampa Bay, and nitrogen emission/deposition factors for air pollutant sources within Hillsborough County (see Figure 1).

---

5. Is the Project for:

Restoration of a polluted area

Mitigation of the effects of pollution

Pollution control activity to prevent or minimize pollution

Educational

6. Is the Project directed toward restoring an identified "polluted area" (a geographic area destroyed or altered by dredging or filling or contaminated by an emission or discharge), or toward terminating an identified pollution source? Identify and explain:

The project is directed toward restoring an identified "polluted area." The goal of the proposed research is to assess by air quality modeling the change in direct and indirect deposition of nitrogen to Tampa Bay as a consequence of the 2002 emissions inventory, and for recent, planned, or possible changes, in air pollutant nitrogen oxide (NO<sub>x</sub>) and ammonia (NH<sub>3</sub>) emissions by Hillsborough County utility, industrial, agricultural and transportation sources.

---

7. Is the harm or potential harm to health, safety or welfare of the public or wildlife actual or potential? Does the project seek to alleviate actual or potential harm and what is the severity of the harm and the causal relationship between the "pollution" and the harm? Identify and explain:

The project seeks to alleviate actual harm to estuarine wildlife by quantifying the relationship between nitrogen emissions from air pollution sources to the amount of nitrogen that reaches the bay from these sources. Atmospheric nitrogen (e.g., NO, NO<sub>2</sub>, HNO<sub>3</sub>, and NH<sub>3</sub>) can deposit to bay waters and contribute to unwanted blooms of algae or bacteria. Algal blooms decrease bay water clarity and thus the transmission of sunlight to the submerged seagrass beds that are vital to a healthy estuarine ecosystem. Seagrass beds stabilize the bay sediment and provide a nursery for many aquatic organisms. The loss of seagrass beds means more turbid bay waters and fewer fish and birds. Water quality modeling and monitoring indicate that the algal blooms are directly dependent on influent nitrogen (TBNEP, 1996).

---

8. How long has the pollution existed or how long before any harm will be evident?

---

Harm to Tampa Bay from nutrient enrichment has been evident for almost 60 years. Since the 1950's nearly half of Tampa Bay's marshes and 40% of its sea grasses have disappeared as a consequence of nutrient enrichment. Reduction of nitrogen concentrations in the effluent of wastewater treatment plants in the mid-1980s resulted in a dramatic improvement in water quality and offered an opportunity for community stakeholders to re-establish lost sea grass beds (TBNEP, 1996). A nitrogen loading inventory by the Tampa Bay National Estuary Program in the mid-1990's revealed that ~25% of the loading was directly from the atmosphere to the bay; and this estimate is now supported with local air quality and rainfall monitoring and modeling (Poor et al., 2001; TBNEP, 1996). An indirect fraction, estimated at 18%, of the nitrogen that deposits to the watershed flows to the bay in surface water runoff (Pollman, 2003). The combination of indirect and direct atmospheric loading may contribute 50% of the 5,000 metric tons of nitrogen that enter Tampa Bay each year (Poor et al., 2006).

---

9. Identify and describe how the project proposes to alleviate the pollution (addressing technical, practical, and cost effectiveness issues):

Stakeholders in the Tampa Bay Estuary Program and members of the Tampa Bay Regional Planning Council have estimated that to prevent further impairment of bay waters, nitrogen flowing into Tampa Bay must be reduced by 17 tons per year (TBNEP, 1996). Assessing the reductions or gains in nitrogen deposition for changes in power plant configurations or levels of vehicular traffic, e.g., are difficult to assess without atmospheric transport modeling. We propose to develop conversion factors for major Hillsborough County sources and source categories that relate tons of nitrogen emitted to tons of nitrogen deposited to Tampa Bay. This will not only aid bay managers in assessing nitrogen emission reductions made in recent years, but will reveal which sources/source categories, if controlled, would affect most the bay water quality.

Air quality models only approximate the complex photolytic, chemical, and physical processes that describe the atmospheric transport, dispersion, transformation, and deposition. Such models, however, if shown to reasonably predict atmospheric pollutant concentrations for typical emission scenarios, can be quite practical and cost-effective for investigating the magnitude and direction of change with changes in model input conditions, e.g., air pollution emissions or land use. Other methods to accomplish this goal would include community intervention (e.g., keep everybody off the road for one day and see what happens to the air quality) or a tracer study (put a rare element in the fuel used by the city fleet of diesel buses and see how the element is distributed in the environment), as examples.

The CALMET/CALPUFF modeling system allows for multiple sources and pollutants, and can numerically simulate the 3-dimensional meteorology from input measurements of weather conditions during the study period. This modeling system is preferred by the USEPA for regulatory modeling of long-range (>50 km or 30 miles) transport, to treat the atmospheric transformation and deposition of pollutants, and to represent wind recirculation and plume fumigation in a coastal setting, as examples. See attached proposal for examples of CALMET/CALPUFF results for local modeled and measured emissions and for a more detailed discussion of the technical issues.

---

10. Is the polluted area one which has previously been subject to commission enforcement and, if so, when and what was the result?

Significant point source discharge of nitrogen to surface waters or to the atmosphere must be permitted under the Clean Water Act or the Clean Air Act, respectively, and as such is subject to either county commission or FDEP enforcement. Lower permitted discharges to air and water have greatly reduced nitrogen emissions over the past two decades. Voluntary actions of bay stakeholders have also significantly reduced nitrogen discharges to Tampa Bay as well.

Over the last decade, however, several large inadvertent or intentional nitrogen discharges have occurred as a consequence of heavy rainfall, hurricane-force winds, and even the sudden bankruptcy and abandonment of a fertilizer manufacturing facility adjacent to the bay. Post-event management has occurred at county and state levels and the events have caused, if not county commission enforcement actions, certainly commission attention to improvements in plant design, permitting and the financial security of industrial activities, as well as funding for needed improvements in county-wide storm water management.

The Florida Department of Environmental Protection (FDEP) and the USEPA did in 1999 bring an enforcement action against TECO for violations in Hillsborough County of the acid rain provisions in the federal Clean Air Act. These simultaneous enforcement actions resulted in landmark agreements for reconfiguring two of the nation's most polluting coal-fired power plants to reduce sulfur dioxide (SO<sub>2</sub>) and NO<sub>x</sub> emissions.

---

11. If no actual pollution exists and no prior commission enforcement action has occurred, does the project otherwise enhance pollution control activities within the County?

The selective catalytic reduction (SCR) system that TECO proposes to install on its Big Bend power plant includes injection of ammonia to react with sulfite that is produced as SO<sub>2</sub> in the exhaust gas passes over the catalyst bed. This could result in a higher concentration of fine particles of ammonium sulfite or sulfate in the exhaust plume. We propose to model the extent to which an increase in NH<sub>3</sub> and fine particle emissions from this plant could cause a change in local air quality and nitrogen deposition rates.

---

12. Can this project be divided into separate and independent parts, and if so,

a) what are they? \_\_\_\_\_

The project could be divided into two parts: modeling for all inventoried sources the air quality and nitrogen deposition for 2002, and repetition of the modeling for each change in source configuration to determine the emission/deposition factors.

---

b) how would the costs be allocated between them? \_\_\_\_\_

Most of the effort is in the preparation of the inventory and the model validation steps, thus the costs would be apportioned ~70% and ~30% for the two efforts, respectively.

---

c) would the applicant be willing to accept only partial funding? \_\_\_\_\_

The proposed effort has been designed to take maximum advantage of available databases and computational resources; however, a 10% reduction in the total cost would not jeopardize the effort.

---

13. Are other funding sources committed to the project? No.

How much and for what? \_\_\_\_\_

The principal investigator has received from 2000 – 2006 funding from FDEP as the local Project Manager for the Bay Regional Atmospheric Chemistry Experiment (BRACE). As such, she has developed knowledge, skills, and experience with inventory databases, meteorological files, CALMET/CALPUFF modeling, observational data and datasets, and data analysis and interpretation that allow her to accomplish the project goals for a competitive cost. The 2002 CALMET files donated by FDEP for this project are valued at \$12,000.

---

14. What other funding sources may be available and how much? \_\_\_\_\_

The principal investigator has received funds in the past for related efforts from the Sarasota Bay National Estuary Program, the Tampa Bay Estuary Program (TBEP), FDEP, the US EPA, and the UF Water Resources Research Center, but does not have a grant pending with any of these agencies at the time of this application submission.

---

15. Why do you believe that this Project is of sufficient importance to justify the expenditure of Pollution Recovery Funds? \_\_\_\_\_

Tampa Bay is an important and unique community resource and its protection has the unambiguous support of local stakeholders. The proposed effort will meet the current need for a method to relate changes in air pollution emissions to changes in bay water quality.

---

16. Will the project enhance the value of private property, and if so, whose? \_\_\_\_\_

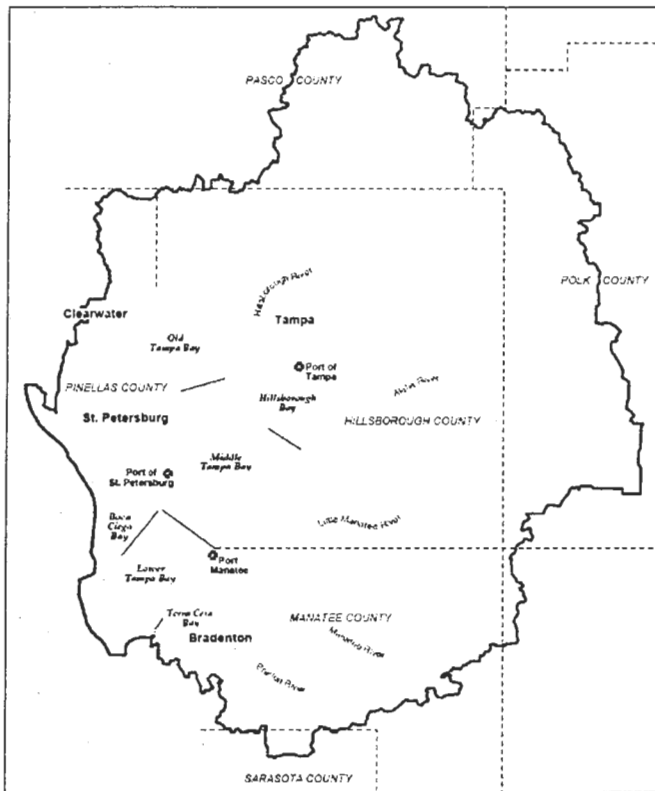
Visual or physical access to Tampa Bay is a market commodity: homes on or near the bay or with a view of the bay are valued higher than comparable homes without this commodity. Improvements in bay water quality will increase the value of this commodity.

---

## B. ATTACHMENTS

### 1. Map of Project Site

Nitrogen in the form of nitrogen oxides (NO<sub>x</sub>), nitric acid (HNO<sub>3</sub>), nitrous acid (HONO), nitrate (NO<sub>3</sub><sup>-</sup>), ammonia (NH<sub>3</sub>), ammonium (NH<sub>4</sub><sup>+</sup>), and organic nitrogen deposit to the earth's surface and if not metabolized or assimilated by plants and animals will flow with storm water to streams and rivers that empty into Tampa Bay or will infiltrate the sandy soils to reach groundwater that



ultimately discharges to Tampa Bay. These nitrogen compounds will also deposit directly to the bay surface in rainfall and by turbulent (dry) transfer. The Tampa Bay watershed and major bay segments are shown in Figure 1. We propose to model the 2002 emissions from six counties that contain a portion of the watershed: Hillsborough, Manatee, Pasco, Pinellas, Polk, and Sarasota counties; nitrogen deposition rates, however, will be estimated only for the 2,200-square mile Tampa Bay watershed and for the 400-square mile Tampa Bay (Figure 1), and nitrogen emission/deposition factors only for Hillsborough County sources.

**Figure 1.** Tampa Bay Estuary watershed boundaries and bay segments (TBNEP, 1996).

## 2. Biographical Sketch for Principal Investigator and Key Personnel

(Biographical sketch is attached)

### Principal Investigator

Noreen D. Poor, Ph. D., P. E., Associate Professor  
USF College of Public Health  
Department of Environmental & Occupational Health  
13201 Bruce B. Downs Blvd  
Tampa, Florida 33612  
Tel: (813) 974-8144; Fax: (813) 974-4986; E-mail: [npoor@health.usf.edu](mailto:npoor@health.usf.edu)

### **BIOGRAPHICAL SKETCH – Noreen D. Poor**

#### **Professional Preparation:**

University of Maryland, University College	B. A.	1976 -1980	Business Management
University of Texas at Austin	M. S. E.	1981 -1985	Mechanical Engineering
Virginia Polytechnic Institute & State Univ.	Ph. D.	1992 -1996	Environmental Engineering

#### **Professional Experience:**

1974-1980	Aviation Electronics Technician, US Navy
1985-1986	Mechanical Engineer, PRC, Inc., Kennedy Space Center, FL
1986-1992	Mechanical Engineer, Submarine Monitoring Maintenance & Support Group Naval Sea Systems Command, Arlington, VA
1996-1997	Adjunct Professor, Civil & Environmental Engineering University of South Florida, Tampa, FL
1997-2004	Assistant Professor, Environmental and Occupational Health University of South Florida, Tampa, FL
2004-Present	Associate Professor, Environmental & Occupational Health University of South Florida, Tampa, FL

#### **Selected Publications:**

Calderón, S. M., **Poor, N. D.**, Campbell, S. Estimation of the particle and gas scavenging contributions to wet deposition of inorganic nitrogen, submitted to *Atmospheric Environment* on 03/20/06; review comments received on 04/24/06; in revision.

Sopkin, K., Mizak, C., Gilbert, S., Subramanian, V., Luther, M., **Poor, N.** Modeling air/sea flux parameters in a coastal area: a comparative study of results from the TOGA COARE model and the NOAA buoy model, submitted to *Atmospheric Environment* on 01/30/06.

Calderón, S. M., **Poor, N. D.**, Campbell, S. Estimation of the particle and gas scavenging contributions to wet deposition of organic nitrogen, submitted to *Atmospheric Environment* on 01/30/06.

Strayer, H., Mizak, C., Smith, R., **Poor, N.** Influence of air mass origin on the wet deposition of nitrogen to Tampa Bay, Florida—An Eight Year Study, submitted to *Atmospheric Environment* on 01/30/06; review comments received 4/28/06; in revision.

Dasgupta, P. K., Campbell, S., Al-Horr, R., Ullah, R. SM., Li, J., **Poor, N.** Conversion of sea salt aerosol to NaNO<sub>3</sub> and the production of HCl: analysis of temporal behavior of aerosol chloride/nitrate and gaseous HCl/HNO<sub>3</sub> concentrations with AIM, submitted to *Atmospheric Environment* on 01/30/06.

Mizak, C., Campbell, S., **Poor, N.** Effect of shoreline meteorological measurements on NOAA buoy model predictions of coastal air-sea gas transfer, *Short Communication*, submitted to *Atmospheric Environment* on 01/30/06.

Kenty, K. L., **Poor, N. D.**, McClenny, W., Kronmiller, K., King, C., Atkeson, T., Campbell, S. W. Roadside study of atmospheric NO/NO<sub>2</sub> transformations, submitted to *Atmospheric Environment* on 01/30/06. Review comments received 3/23/06; in revision.

Calderón, S., **Poor, N.**, Campbell, S. Investigation of the UV photolysis method for the determination of organic nitrogen in aerosol samples, accepted for publication by *Journal of Air & Waste Management* on 03/25/06.

**Poor, N.**, Pollman, C., Tate, P., Begum, M., Evans, M., Campbell, C., 2006. Nature and magnitude of atmospheric fluxes of total inorganic nitrogen and other inorganic species to the Tampa Bay watershed, FL, USA, *Water, Air, and Soil Pollution* DOI: 10.1007/s11270-006-3055-6.

Park, S. S., Pancras, J. P., Ondov, J., **Poor, N.** 2005. A new pseudo-deterministic multivariate receptor model for accurate individual source apportionment using highly time-resolved ambient concentration measurements. *J. of Geophysical Research*, 110: D07S15.

Mizak, C. A., Campbell, S. W., Luther, M. E., Carnahan, R. P., Murphy, R. J., **Poor, N. D.** 2005. Below-cloud ammonia scavenging in convective thunderstorms at a coastal research site in Tampa, FL, USA. *Atmospheric Environment* 39: 1575-1584.

**Poor, N.**, Tremblay, R., Kay, H., Bhethanabotla, V., Swartz, E., Luther, M., Campbell, S. 2004. Atmospheric concentrations and dry deposition rates of polycyclic aromatic hydrocarbons (PAHs) for Tampa Bay, Florida, USA, *Atmospheric Environment* 38: 6005-6015.

Evans, M., Campbell, S., Bhethanabotla, V., and **Poor, N.**, 2004. Effect of sea salt and calcium carbonate interactions with nitric acid on the direct dry deposition of nitrogen to Tampa Bay, Florida. *Atmospheric Environment*, 38:4847-4858.

**Poor, N.** 2004. Contribution of industrial atmospheric ammonia emissions to nitrogen loading in the Tampa Bay Estuary, Tampa, FL, USA. Proceedings of the USEPA International Emission Inventory Conference held June 7-10, 2004, in Clearwater, Florida.

**Poor, N.**, Campbell, S., and Kay, H. Source attribution for the atmospheric deposition of polycyclic aromatic hydrocarbons (PAHs) to Tampa Bay, BASIS- 4: The Fourth Tampa Bay Area Scientific and Information Symposium, October 27-30, 2003, St. Petersburg, FL.

Campbell, S. W., Evans, M. C., and **Poor, N.D.**, 2002. Predictions of size-resolved aerosol concentrations of ammonium, chloride and nitrate at a bayside site using EQUISOLVII. *Atmospheric Environment*, 36: 4299-4307.

**Poor, N. D.**, Clark, T., Nye, L., Tamanini, T., Tate, T., Stevens, R., Atkeson, T., 2002. Field performance of dichotomous sequential PM air samplers, *Atmospheric Environment*, 36: 3289-3298.

**Poor, N. D.**, Pribble, R. and Greening, H. 2001. Direct wet and dry deposition of ammonia, nitric acid, ammonium and nitrate to the Tampa Bay Estuary, FL, USA, *Atmospheric Environment* 35: 3947-3955.

### **Synergistic Activities:**

2000-Present Bay Regional Atmospheric Chemistry Experiment (BRACE), Principal Investigator, Florida

## Department of Environmental Protection

The goals of this multi-year project are to better estimate nitrogen deposition rates to Tampa Bay, to apportion nitrogen deposition among its sources, and to assess the impact on air quality and nitrogen deposition from the re-powering of a power plant from coal to natural gas.

Instructor for graduate courses including Analysis of Water & Wastewater and Community Air Pollution.

### **Collaborators and Co-authors**

#### (a) Collaborators and co-authors

Rida Al-Horr, Thomas Atkeson, Mubeena Begum, Venkat Bhethanabotla, Silvia Calderón, Scott Campbell, Robert Carnahan, Sr., Purnendu Dasgupta, Melissa Evans, Sherryl Gilbert, Holly Greening, Heidi Kay, Kerstin Kenty, Clark King, Keith Kronmiller, J. Li, Clemente Lopez, Mark Luther, William McClenny, Connie Mizak, Jeremiah Murphy, Larry Nye, John Ondov, Patrick Pancras, Sun Park, Curtis Pollman, Ray Pribble, Alberto Sagues, Kristin Sopkin, Robert Stevens, Vembu Subramanian, Hillary Strayer, Erik Swartz, Thomas Tamanini, Raphael Tremblay, Rahmat Ullah

#### (b) Graduate and Postdoctoral Advisors

Nolan Hertel, John Novak

#### (c) Thesis Advisees and Post-Graduate Scholars

Hazel Barclay, Silvia Calderón, Julie Earls, Melissa Evans, Heather Hendrix-Holmes, Ilsa Johanssen, Connie Mizak, Scott Mower, Joseph Patrick Pancras, Patrick Shell, Ronald David Smith, Paul Tate, Renee Weaver

### 3. Project Narrative

#### a) Project Objectives

Local agencies, institutions, universities, corporations, and governments that are involved in bay monitoring and management, e.g., as stakeholders in the Tampa Bay Estuary Program or as members of the Tampa Bay Regional Planning Council, have estimated that to prevent further impairment of bay waters, nitrogen flowing into Tampa Bay must be reduced by 17 tons per year (TBNEP, 1996). Assessing the reductions or gains in nitrogen deposition for changes in power plant configurations or for levels of vehicular traffic, e.g., are difficult to assess without atmospheric transport modeling. We propose to develop conversion factors for major sources (Table 1) and source categories in Hillsborough County that relate tons of nitrogen emitted to tons of nitrogen deposited to Tampa Bay. This will not only aid bay managers in assessing atmospheric nitrogen emission reductions made in recent years, but will reveal which sources/source categories, if controlled, would influence most the bay water quality.

**Table 1.** Major stationary sources of NO<sub>x</sub> or NH<sub>3</sub> in Hillsborough County, FL, between 1997-2010.

Source	NO <sub>x</sub> or NH <sub>3</sub> Control	Pre-Control Year	Post-Control Year
TECO Big Bend	SCR completion in 2010	2002 <sup>a,b</sup>	2002 <sup>d</sup>
TECO Gannon	Re-powered to natural gas	1997 <sup>a</sup>	2005 <sup>a</sup>
TECO Hooker's Point	Shut down	1997 <sup>a</sup>	2002 <sup>e</sup>
City of Tampa	MACT controls	1999 <sup>b</sup>	2002 <sup>b</sup>
HC Resource Recovery	MACT controls	1999 <sup>b</sup>	2002 <sup>b</sup>
Nitram	Shut down in 2004	2002 <sup>b,c</sup>	2002 <sup>e</sup>
CF Industries	None	2002 <sup>b,c</sup>	2002 <sup>e</sup>
Cargill Fertilizer (now MOSAIC)	NH <sub>3</sub> controls	1999 <sup>b,c</sup>	2003 <sup>c</sup>
National Gypsum	None	2002 <sup>b,c</sup>	2002 <sup>e</sup>
Coronet Industries	Shut down in 2004	1999 <sup>b,c</sup>	2002 <sup>e</sup>

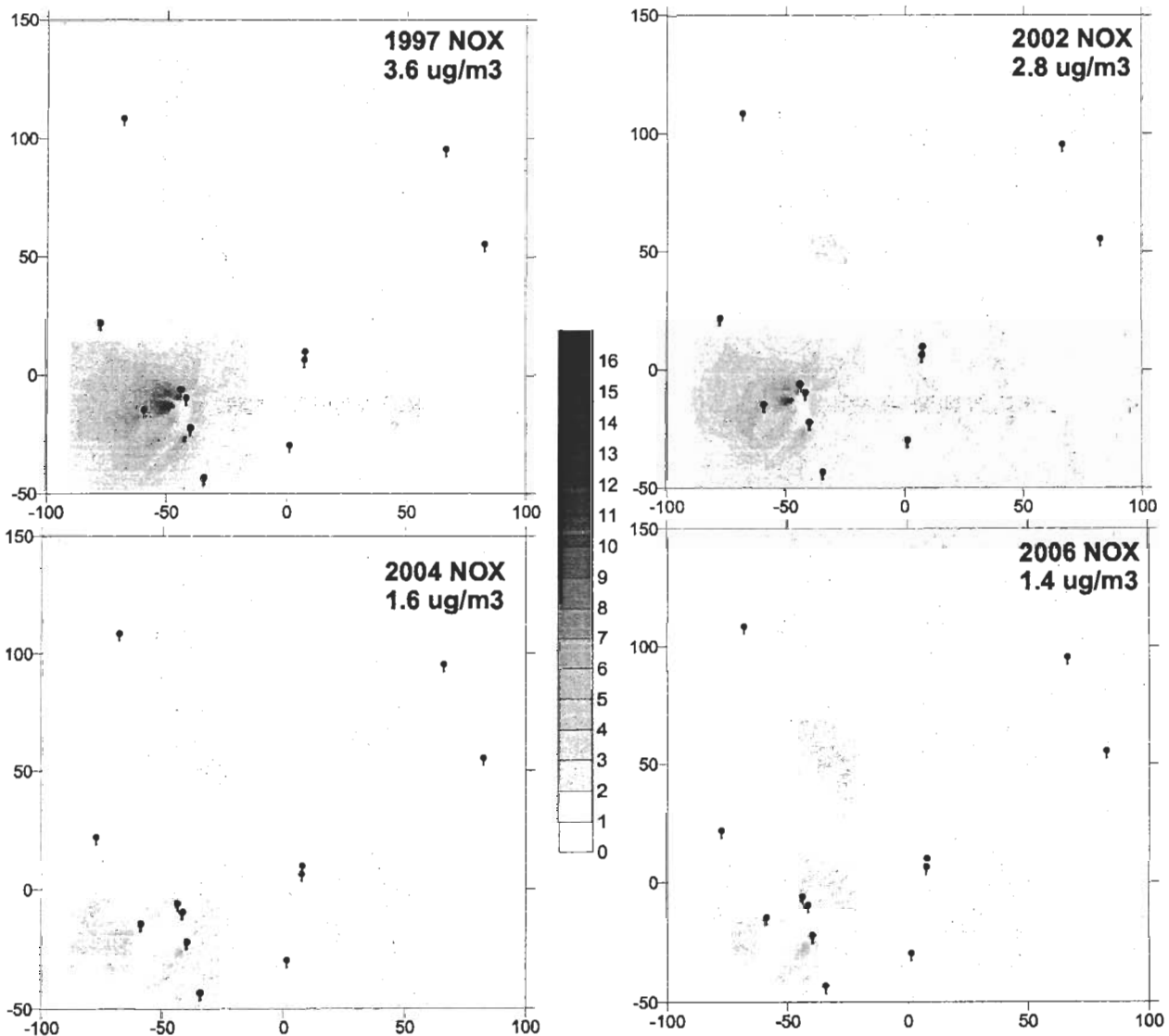
<sup>a</sup>Clean Air Progress and Reports; <sup>b</sup>National Emission Inventory (NEI); <sup>c</sup>Toxic Release Inventory; <sup>d</sup>forecasted emissions;

<sup>e</sup>zero emissions

#### b) Results and/or Benefits Expected

The primary benefit to the grantee and the bay is an estimate of the Hillsborough County nitrogen reduction credits for recently installed air pollution controls, and an assessment of which source

or source category influences most the bay water quality. Secondary benefits include (1) an analysis of the post-control  $\text{SO}_2$  and  $\text{NO}_x$  atmospheric concentrations (e.g., Figure 2) that can be related directly to a reduction in risk of morbidity and mortality for residents of Hillsborough County (Levy and Spengler, 2002), (2) input to work groups studying management strategies for impaired waters in northeastern Tampa Bay watersheds, (3) an estimate of the potential increase in county-wide fine particle concentrations as a consequence of  $\text{NO}_x$  control by selective catalytic reduction, and (4) comparative results with BRACE-funded community multi-scale air quality (CMAQ) modeling.



**Figure 2.**  $\text{NO}_x$  concentrations in Hillsborough and Pinellas Counties modeled in CALMET/CALPUFF with May 2002 meteorology and 1997, 2004, and 2006 known and projected emission rates for all major  $\text{NO}_x$  stationary sources in west central Florida. Distances on the x and y axes are in kilometers; concentration scale is in micrograms per cubic meter.

### c) General Project Information

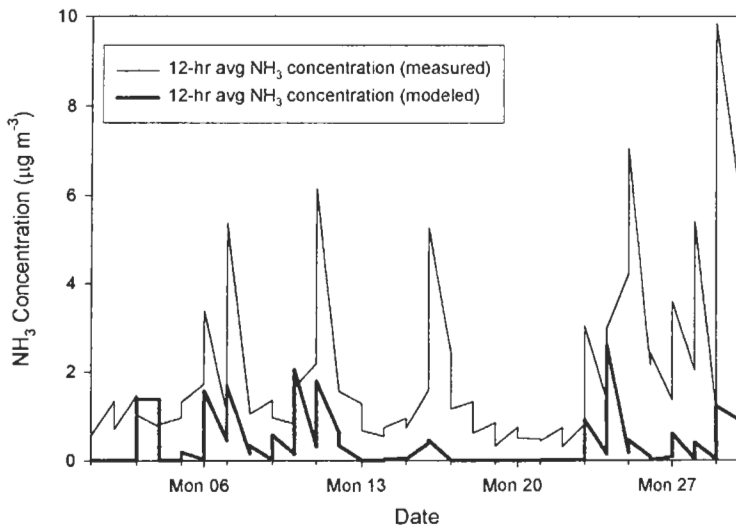
The overall success of this project depends on

- The ability of the 2002 CALMET/CALPUFF model to predict observed weather patterns and air pollution concentrations;
- Timely completion of the project effort;
- The acceptance local bay managers and stakeholders of the emission/deposition factors based on the modeling inputs, assumptions, and validation steps; and
- Publication of the results in a peer-reviewed journal.

All four of these success measures depend to some extent upon satisfactory model performance. We have chosen the CALMET/CALPUFF modeling system for its ability to more realistically characterize wind and pollutant transport and transformation over an urban scale as compared with the federal regulatory Gaussian plume models (Carper and Ottersburg, 2003); its

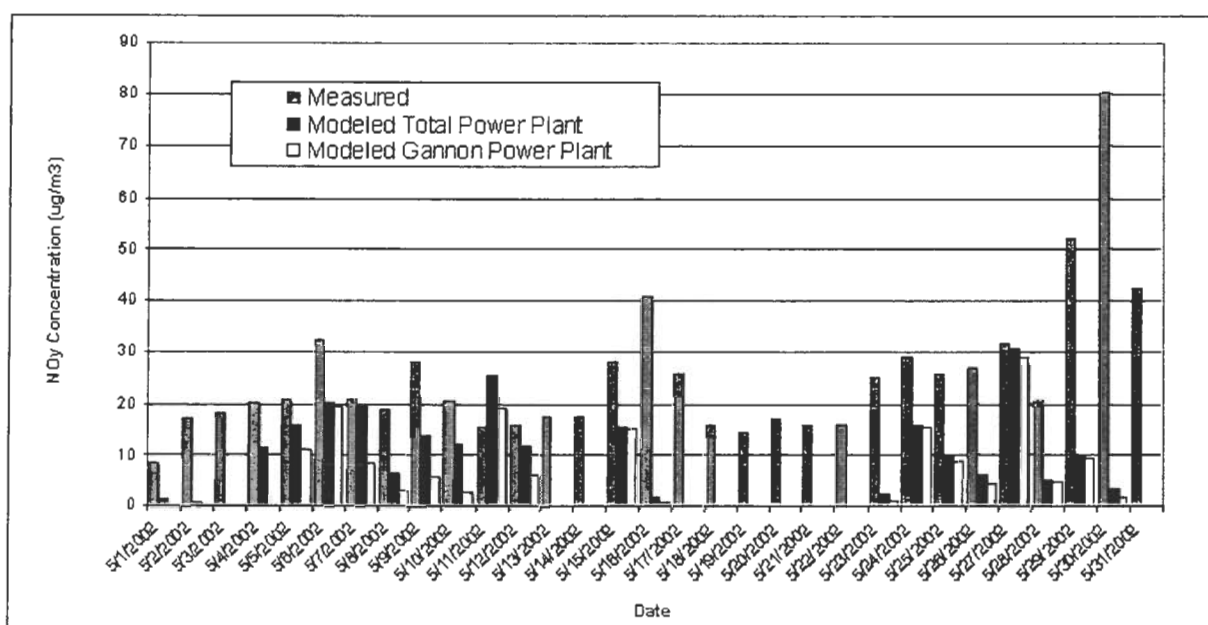
relative ease of use and low computational demands when compared with a dynamical models (Seaman, 2000); and its public domain availability, peer review, and use for similar nitrogen deposition studies (Allwine, 1998; Yegnan et al., 2003).

**Figure 3.** CALMET/CALPUFF -modeled and measured ammonia concentrations at the Gandy Bridge monitoring site for industrial point sources of ammonia emissions (Poor, 2004).



Model performance evaluation can identify if the model output is biased due to errors in the input data, in the mathematical representations of physical and chemical processes, and in the numerical techniques used to solve complex non-linear equations, as examples. Three approaches to evaluating modeled meteorology or air pollutant concentrations are comparisons (1) with actual observations (Jacobson, 1999; Yegnan et al., 2003), (2) with output from another model, whose performance has been previously judged

(USEPA, 1998b); and (3) with a physical model or released tracer concentration (USEPA, 1998a). Our strategy will be to compare modeled with measured wind speed, wind direction, temperature, humidity, and air pollutant concentrations (e.g., Figures 3 and 4). A large disparity in the modeled versus measured air pollutant concentrations can signal several problems: an incomplete or erroneous emissions inventory, misrepresentation of background concentrations, or transformation rates that are too high or too low, as examples. If such a disparity occurs, we will attempt to diagnose it, fix or isolate it, and/or quantify its effect on the final emission/deposition ratios.



**Figure 4.** CALMET/CALPUFF-modeled NO<sub>x</sub> emissions from power plants and measured NO<sub>y</sub> concentrations at the Gandy Bridge monitoring site for May 2002.

Temporal and spatial differences between modeled and measured values are characterized by statistics such as the “mean bias”, “mean normalized bias”, mean absolute gross error”, “root mean square error”, “normalized mean square error”, the “mean fractional bias”, and “normalized difference”, “normalized gross error”, and from the “coefficient of correlation” or “fraction of predictions within a factor of 2”, as examples (Arnold, et al., 2006; Park et al., 2005; Sopkin et al., 2006; Tesche et al., 2000). A “normalized mean square error” of  $\leq 50\%$  or a “fraction of predictions within a factor of 2”  $\geq 80\%$  have been interpreted as success (Park et al., 2005; Sopkin et al., 2006). Tesche et al. (2000) set as criteria for success of their peninsular Florida ozone modeling a gross error  $\leq 35\%$  and an overall bias  $\leq \pm 15\%$ , which they based on their previous modeling experience.

As a minimum, we will calculate the overall, location-specific, and time-specific “normalized gross error” (NGE) and the “normalized bias” (NB), as given in Appendix A, for observational data from the meteorological and air pollutant sites listed in Table A-1. We will consider an NGE and an NB of  $\leq 30\%$  and  $\leq \pm 15\%$ , respectively, for winds, temperature, humidity, and  $\text{SO}_2$  as satisfactory model performance. For  $\text{NO}_x$ ,  $\text{NH}_3$ , and fine particle sulfate, an NGE and an NB of  $\leq 50\%$  and  $\leq \pm 25\%$  will be considered satisfactory.

#### **4. Scope of Work**

Our proposed effort will predict with the CALMET/CALPUFF modeling system for 2002 the hourly atmospheric concentrations and surface deposition rates of nitrogen oxides ( $\text{NO}_x$ ), nitric acid ( $\text{HNO}_3$ ), ammonia ( $\text{NH}_3$ ), and ammonium ( $\text{NH}_4^+$ ) for the Tampa Bay Estuary watershed, including Tampa Bay (Figure 1). From these modeled data we can calculate the total nitrogen deposition to Tampa Bay. Modeled emissions will include inventoried stationary, area, on-road, off-road, agricultural, and biogenic sources for Hillsborough, Manatee, Pasco, Pinellas, Polk, and Sarasota counties.

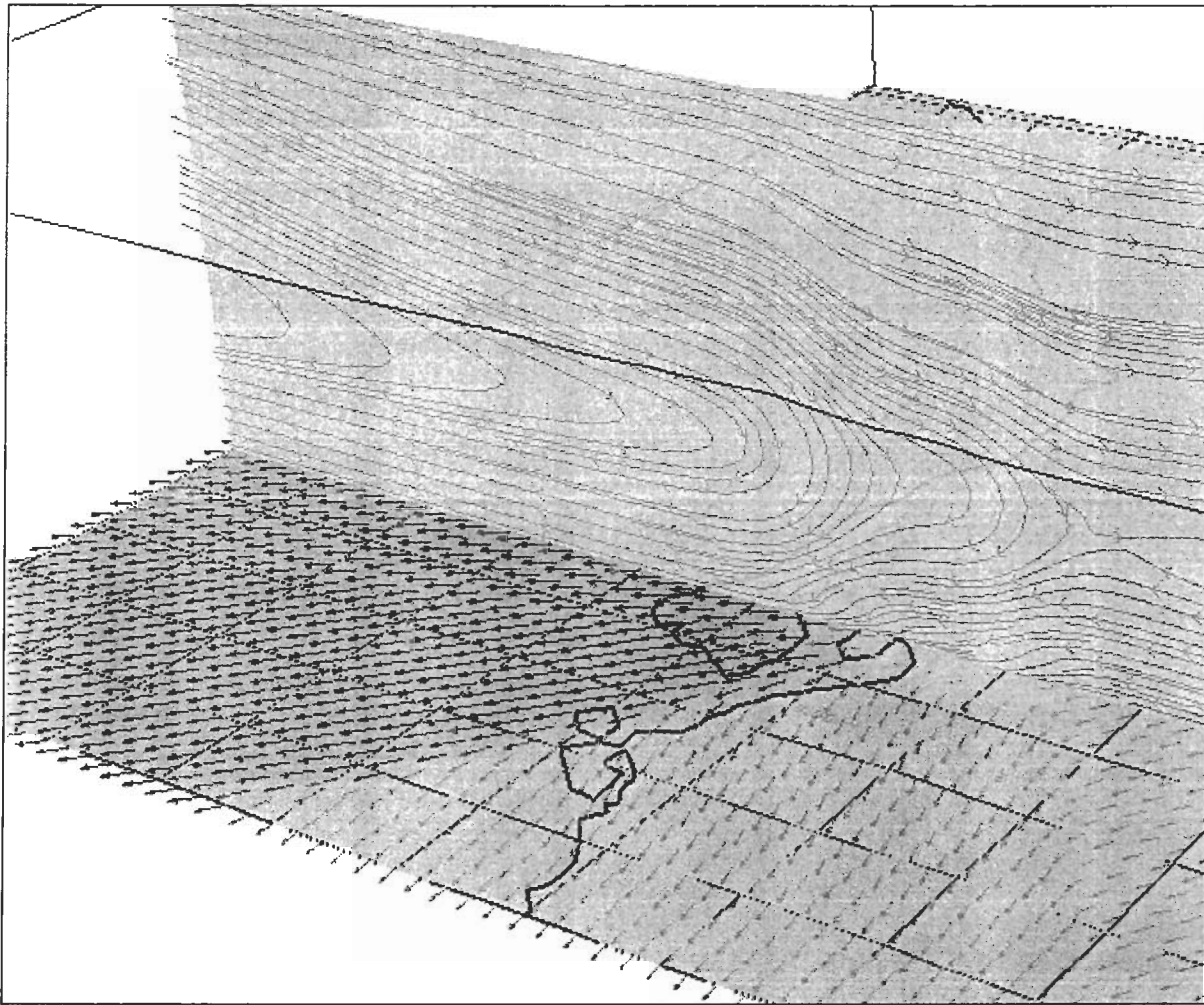
The CALMET/CALPUFF modeling system consists of three separate modules: CALMET, CALPUFF, and CALPOST (Scire et al., 2000a; Scire et al., 2000b). CALMET is a meteorological model that re-creates the 3-dimensional winds and temperatures throughout the modeling domain based on inputs from MM5 meteorological modeling of the wind patterns across the US, from which the Florida winds are extracted, and on surface twice-daily vertical observations of winds, temperature, pressure, humidity, for example, and rainfall, solar radiation, and cloud cover observations, from Florida weather monitoring networks. CALMET uses the meteorological input to calculate the micrometeorological parameters for each grid cell needed to compute the air pollutant dispersion, transformation, and surface deposition. CALPUFF is a transport and dispersion model that tracks the fate each “puff” of pollutant emitted as it moves through the modeling domain in time and space. In the CALPUFF model the transformation of  $\text{SO}_2$  to sulfate and  $\text{NO}_x$  to nitric acid can be simulated. CALPOST is a menu-driven computer program that allows the user to extract the model data from the binary file created by CALPUFF to a format that can be read easily by a spreadsheet or by spatial plotting software. The 2002 CALMET

modeling input files will be provided by FDEP. These files were created by Dr. Joe Scire, Earth Tech, Inc., who is also the primary author and caretaker of the CALMET/CALPUFF modeling system. These files include a compiled 4-km CALMET input file for Florida, initialized with a national-scale MM5 wind field, plus all of the input files needed to re-compile CALMET for another modeling domain and grid scale within Florida.

The modeling domain will be 400 km x 400 km with a 2.0 km grid scale and 12 vertical layers. This modeling domain is much larger than the Tampa Bay Estuary watershed, but such a domain size is necessary to track air nitrogen emissions that may move offshore in the morning on the land breeze to return in the afternoon on the sea breeze, for example (Venegas et al., 2001).

The first step in the project is to re-compile and run CALMET with proposed modeling domain for 2002. The second step is to validate the modeled meteorology as described under "General Project Information". The hourly 3-dimensional wind fields will also be visually reviewed in the Environmental Workbench and compared with observational data to see if the model simulates the land-sea breeze (e.g., Figure 5). The results of these comparisons will be posted with explanations on a project website for review and comment (see Project Management).

The third step is to prepare the 2002 six-county emissions inventory. Emissions for all six counties need to be in the 2002 CALMET/CALPUFF model so that we can validate the modeled atmospheric concentrations with the observed concentrations. The impact on air quality from counties beyond these six can be represented in the model as a background concentration. The emissions inventory data will be assembled from the USEPA 2002 National Emissions Inventory (USEPA, 2006a), the USEPA 2002 Toxics Release Inventory (USEPA, 2006b), the USEPA Clean Air Progress and Reports (USEPA, 2006c), the Carnegie Mellon University Ammonia Emission Inventory for the Continental United States (CMU, 2006), and supplemented as necessary with emissions data from county and state databases.



**Figure 5.** Diagnostic wind fields (horizontal vectors at 10m and vertical streamlines; April 1, 2000, 0500UTC) produced by CALMET for Tampa Bay and displayed by Environmental Workbench.

As a fourth step, we will run the CALPUFF model and compare the predicted atmospheric concentrations with concentrations measured at continuous SO<sub>2</sub>, NO<sub>x</sub>, and PM<sub>2.5</sub> monitors within the Tampa Bay Estuary watershed for which hourly averages for 2002 are available (Table A-1), as described under “General Project Information”. Statistical analyses of the secondary gas and particle (e.g., nitric acid, sulfate) and ammonia concentrations will be limited to a subset of the annual data made as part of BRACE. The results of these comparisons will be posted with explanations on a project website for review and comment (see Project Management). Once any problems are diagnosed and corrected, the model will be run for different air pollution “control” scenarios to obtain the emission to deposition ratios.

For the fifth step, we will run the CALPUFF model for each control scenario to obtain the

emission to deposition ratio for every major Hillsborough County NO<sub>x</sub> or NH<sub>3</sub> stationary source (e.g., a major source emits more than 100 tons of nitrogen per year), and for Hillsborough County emissions from area, on-road, off-road, agricultural, and biogenic source categories. The major stationary sources are listed in Table 1, with their proposed pre-control and post-control inventory year for modeling. For the TECO Big Bend power plant we will adjust the 2002 hourly emissions to reflect the forecasted 2010 emissions. For the remaining source categories, the “control” scenario will be to run the CALPUFF model with the source category at 75% of its 2002 emissions and calculate the change in the total atmospheric nitrogen deposition to the bay. The emission removed divided by the reduction in total nitrogen deposited to the bay is the emission to deposition factor (e.g., tons N emitted/tons N deposited).

The FDEP, as part of BRACE, is sponsoring an air quality modeling effort for regional application to Tampa, FL. NOAA scientists and consultants experienced with MM5 meteorological processing and with a community multiscale air quality model (CMAQ) have made significant progress in model development, validation, and diagnostic testing (Arnold et al., 2005) using BRACE May 2002 measurements. The CMAQ model is a dynamical prognostic model with state-of-the-art numerical modeling of atmospheric chemistry and physics, including ozone and fine particle formation. Upon completion of a model diagnostic evaluation, now in progress, NOAA scientists and consultants will apply the model to representative meteorology to address air quality and nitrogen deposition questions in west central Florida (Arnold et al., 2005). We are proposing a parallel, streamlined, application-oriented modeling effort with CALMET/CALPUFF. The advantage to the apparent duplication of effort is that the CALMET/CALPUFF modeling system is faster and easier to use (and thus less costly), for example, and can be used to model air pollution control strategies for an entire year instead of a few weeks of meteorology. Moreover, as the accuracy of CMAQ model improves through diagnostic testing and model development with BRACE measurements, the improvement can be reformulated for CALMET/CALPUFF, which gives our community a ready resource for air pollutant permit and compliance modeling.

We recognize that as with any air quality modeling exercise, we must trade-off the accuracy and quantity of the input meteorological and emissions inventory data, and the accuracy of the mathematical of photochemical, chemical, and physical processes, with the need for an answer

or outcome for an affordable cost and within a reasonable time. Such a trade-off limits us to modeling one year of meteorological data and to the use of public-domain databases, models, and literature in developing the input files and model parameterizations.

The CALPUFF model does not include an algorithm to estimate particulate ammonium ( $\text{NH}_4^+$ ) from  $\text{NH}_3$  emissions, but can estimate the formation of sulfate ( $\text{SO}_4^{2-}$ ) from  $\text{SO}_2$  emissions. From our monitoring data we know that  $\text{NH}_4^+$  and  $\text{SO}_4^{2-}$  are highly correlated and are present in our atmosphere mostly as ammonium bisulfate and ammonium sulfate (Campbell et al., 2002). Thus, our approach will be to model  $\text{SO}_2$  emissions and transformation of  $\text{SO}_2$  to  $\text{SO}_4^{2-}$ , then use  $\text{SO}_4^{2-}$  concentrations to estimate  $\text{NH}_4^+$  concentrations based on their relative proportions in the atmosphere. We can then subtract the  $\text{NH}_4^+$  concentrations from the  $\text{NH}_3$  concentrations and calculate the nitrogen deposition separately for these species.

The  $\text{NO}_x$  transformation scheme used within the CALPUFF model assumes that  $\text{NO}_x$  is transformed to nitric acid ( $\text{HNO}_3$ ), and  $\text{HNO}_3$  partitions into a fine particle of ammonium nitrate, depending upon the temperature and relative humidity. Our research has shown that  $\text{HNO}_3$  reacts with sea salt in our marine atmosphere to form a coarse particle of sodium nitrate (Campbell et al., 2002; Evans et al., 2004; Dasgupta et al., 2006). The coarse particle sodium nitrate has a higher deposition velocity and is more easily scavenged by rainfall than is fine particle ammonium nitrate (Calderón et al., 2006). Our approach will be to model the  $\text{NO}_x$  emissions assuming no transformation, then again with a user-defined  $\text{NO}_x$  to  $\text{HNO}_3$  transformation rate. The difference in  $\text{NO}_x$  concentration between these two runs is the  $\text{HNO}_3$  concentration. We will model  $\text{HNO}_3$  deposition to approximate  $\text{HNO}_3$  plus coarse particle  $\text{NO}_3^-$ . This will contribute a positive bias to the nitrogen deposition results (Evans et al., 2004), but will improve the estimates over the default CALPUFF algorithms.

## Project Management

The project schedule and milestones are given in Table 2. We will invite members of the TBEP Tampa Bay Atmospheric Deposition Subcommittee (TBADS) to review and comment on our interim results. To facilitate review and comment, we will post our interim results (e.g., milestones labeled “Present Results”) to a project website and notify TBADS members by e-mail of the

project status. The "Draft Final Report" will be presented in person to TBADS members, and printed copies distributed for review and comment.

**Table 2.** Project Schedule and Milestones

Project Milestones	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07
Project Period	∞											∞
Run CALMET	∞											
Validate CALMET	∞											
Present Results	∞											
Emissions Inventory		∞	∞									
Run CALPUFF				∞	∞							
Validate CALPUFF						∞						
Present Results						∞						
Run Control Scenarios						∞				∞		
Compute Factors						∞				∞		
Present Results									∞			
Draft Final Report										∞		
External Review											∞	
Final Report											∞	∞

#### 4. Budget Information

##### Budget Justification

The project budget is presented in Table 3. The cost for the Principal Investigator, Noreen Poor, is calculated at 25% of her time at a base salary of \$86,052, a fringe benefit rate of 18.58%, and annual health insurance costs of \$8,592. The cost of materials includes two 300 Gbyte external hard drives to store the input and output CALMET files, and \$2,000 for the Environmental Workbench Software. The Environmental Workbench software, available through WindLogics, Inc., has the ability to plot the 3-dimensional CALMET wind fields and will be used to visual the modeled land-sea breeze for comparison with measured winds. Other costs include presentation of our research at the June 2007 Annual Air & Waste Management Conference in Pittsburg, PA (\$1,500), and publication of two articles (30 pages @ \$79 per page = \$2,370) in the *Journal of Air & Waste Management*.

**Table 3.** Project Budget

Budget Categories	PRF Funds	Federal	Applicant	State	Other
<b>a. Personnel</b>					
<b>Noreen Poor</b>	\$27,658				
<b>b. Administrative</b>	\$0				
<b>c. Materials</b>	\$2,560				
<b>d. Contractual</b>	\$0				
<b>e. Construction</b>	\$0				
<b>f. Other</b>	\$3,870				
<b>g. Total Direct Cost</b>	\$34,088				
<b>h. Indirect Cost</b>	\$6,818				
<b>i. Total Cost</b>	\$40,906				

## Appendix A

The below statistics are summarized by Jacobson (1999, pages 550-551).

NGE = overall normalized gross error

NGE<sub>x</sub> = location-specific NGE

NGE<sub>t</sub> = time-specific NGE

NB = normalized bias

N<sub>tim</sub> = number of times that observations were taken

N<sub>obs</sub> = number of observations taken at each time

P = predicted value

O = observed value

x<sub>i</sub> = location of site i

t<sub>j</sub> = jth time period

$$NGE = \frac{1}{N_{tim} N_{obs}} \sum_{j=1}^{N_{tim}} \left( \sum_{i=1}^{N_{obs}} \frac{|P_{x_i, t_j} - O_{x_i, t_j}|}{O_{x_i, t_j}} \right)$$

$$NGE_x = \frac{1}{N_{tim}} \sum_{j=1}^{N_{tim}} \frac{|P_{x, t_j} - O_{x, t_j}|}{O_{x, t_j}}$$

$$NGE_t = \frac{1}{N_{obs}} \sum_{i=1}^{N_{obs}} \frac{|P_{x_i, t} - O_{x_i, t}|}{O_{x_i, t}}$$

$$NB = \frac{1}{N_{tim} N_{obs}} \sum_{j=1}^{N_{tim}} \left( \sum_{i=1}^{N_{obs}} \frac{(P_{x_i, t_j} - O_{x_i, t_j})}{O_{x_i, t_j}} \right)$$

**Table A-1** Observational data available for model validation

Sites	Observational Data	Comments
Tampa International Airport, Orlando International Airport, Orlando/Sanford Airport, Sarasota/Bradenton Airport, and Vero Beach Municipal Airport	Hourly surface weather observations	National Weather Service (NWS) Automated Surface Observing Systems (ASOS)
Ruskin, Orlando, Melbourne	Twice-daily vertical soundings	National Weather Service (NWS)
Sydney, Weedon Island, Simmons Park	Hourly surface winds and vertical soundings	BRACE, May 2002
Davis Island, East Bay, Gandy Bridge, Plant City, Simmons Park, Sydney; Azalea Park, Chesnut Park, US19N; Bray Park, 39 <sup>th</sup> Street	Surface wind speed, wind direction	Environmental Protection Commission of Hillsborough County; Pinellas County Department of Environmental Management; Manatee County
Ballast Point, Causeway, Davis Island, East Bay, Simmons Park, Sydney; Chesnut Park, Derby Lane, Resource Recovery, US19N; Port Manatee	SO <sub>2</sub> concentrations	Environmental Protection Commission of Hillsborough County; Pinellas County Department of Environmental Management; Manatee County
Gandy Bridge, Simmons Park, Sydney; Azalea Park; Bray Park	NO, NO <sub>2</sub> concentrations	Environmental Protection Commission of Hillsborough County; Pinellas County Department of Environmental Management; Manatee County
Palma Ceia; Azalea Park	PM <sub>2.5</sub> (Either hourly or 24-hr)	Environmental Protection Commission of Hillsborough County; Pinellas County Department of Environmental Management
Sydney	Hourly ammonia, ammonium, sulfate, NO <sub>2</sub> , NO <sub>y</sub> , nitric acid, and nitrate concentrations	BRACE, May 2002
Gandy Bridge, Azalea Park	Hourly NO <sub>y</sub> , nitric acid	BRACE, May 2002
Gandy Bridge	Hourly nitric acid	BRACE, June – December 2002
Gandy Bridge, Simmons Park, Sydney	24-hr averaged ammonia, ammonium, SO <sub>2</sub> , sulfate, nitric acid, and nitrate concentrations	BRACE, 2002

## References

Allwine, K. J., Dabbert, W. F., Simmons, L. L., 1998. Peer Review of the CALMET/CALPUFF Modeling System. EPA Contract No. 68-D-98-092, Work Assignment No. 1-03, KEVRIC Company, Durham, NC.

Arnold, J. R., Nolte, C. G., Dennis, R. L., 2005. Diagnostic evaluation of the U. S. EPA community multiscale air quality modeling system (CMAQ-UCD) v4.4 in a regional application to Tampa, Florida. NOAA Air Resources Laboratory, Atmospheric Sciences Modeling Division, and the US EPA Office of Research and Development, National Exposure Research Laboratory. Final report to the Florida Department of Environmental Protection.

Arnold, J. R., Hartsell, B. E., Luke, W. T., Ullah, SM. R., Dasgupta, P. K., Huey, L. G., Tate, P., 2006. Field testing four methods for gas-phase ambient nitric acid. Submitted to *Atmospheric Environment* in March 2006.

Calderón, S. M., Poor, N. D., Campbell, S. W., 2006. Estimation of the particle and gas scavenging contributions to wet deposition of inorganic nitrogen. Submitted to *Atmospheric Environment* in March 2006.

Carper, E., Ottersburg, E., 2003. Significance of a CALPUFF near-field analysis, paper #70052. *Proceedings of the Air & Waste Management 96<sup>th</sup> Annual Conference and Exhibition*, June 22-26, 2003, San Diego, CA.

Campbell, S. W., Evans, M. C., and Poor, N.D., 2002. Predictions of size-resolved aerosol concentrations of ammonium, chloride and nitrate at a bayside site using EQUISOLVII. *Atmospheric Environment*, 36: 4299-4307.

CMU, 2006. CMU Ammonia Emission Inventory for the Continental United States. <http://www.cmu.edu/ammonia/>. Accessed April 23, 2006.

Dasgupta, P. K., Campbell, S., Al-Horr, R., Ullah, R. SM., Li, J., Poor, N., 2006. Conversion of sea salt aerosol to  $\text{NaNO}_3$  and the production of HCl: analysis of temporal behavior of aerosol chloride/nitrate and gaseous HCl/ $\text{HNO}_3$  concentrations with AIM. Submitted to *Atmospheric Environment* in February 2006.

Evans, M., Campbell, S., Bhethanabotla, V., and Poor, N., 2004. Effect of sea salt and calcium carbonate interactions with nitric acid on the direct dry deposition of nitrogen to Tampa Bay, Florida. *Atmospheric Environment*, 38:4847-4858.

Jacobson, M. Z., 1999. *Fundamentals of Atmospheric Modeling*. Cambridge University Press, Cambridge, UK, pp. 656.

Levy, J. I., Spengler, J. D., 2002. Modeling the benefits of power plant emissions controls in Massachusetts, *Journal of the Air & Waste Management Association*, 52: 5-18.

Park, S. S., Pancras, J. P., Ondov, J., Poor, N., 2005. A new pseudodeterministic multivariate receptor model for individual source apportionment using highly time-resolved ambient concentration measurements.

Scire, J. S., Francoise, R. R., Fernau, M. E., Yamartino, R. J., 2000a. User's Guide for the CALMET Meteorological Model (Version 5), Earth Tech, Inc. Concord, MA. *Journal of Geophysical Research*, 110: D07S15, doi: 10.1029/2004JD004664.

Pollman, C., 2003. Export of atmospherically-derived nitrogen in the Tampa Bay watershed, AGU 2003 Fall Meeting, San Francisco, CA, 8-12 December.

Poor, N., Pollman, C., Tate, P., Begum, M., Evans, M., Campbell, C., 2006. Nature and magnitude of atmospheric fluxes of total inorganic nitrogen and other inorganic species to the Tampa Bay watershed, FL, USA, *Water, Air, and Soil Pollution* DOI: 10.1007/s11270-006-3055-6.

Poor, N. 2004. Contribution of industrial atmospheric ammonia emissions to nitrogen loading in the Tampa Bay Estuary, Tampa, FL, USA. *Proceedings of the USEPA International Emission Inventory Conference*, June 7-10, 2004, in Clearwater, Florida.

Poor, N. D., Pribble, R. and Greening, H. 2001. Direct wet and dry deposition of ammonia, nitric acid, ammonium and nitrate to the Tampa Bay Estuary, FL, USA, *Atmospheric Environment* 35: 3947-3955.

Scire, J. S., Strimaitis, D. G., Yamartino, R. J., 2000b. User's Guide for the CALPUFF Dispersion Model (Version 5), Earth Tech, Inc. Concord, MA.

Seaman, N. L., 2000. Meteorological modeling for air quality assessments. *Atmospheric Environment*, 34: 2231-2259.

Sopkin, K., Mizak, C., Gilbert, S., Subramanian, V., Luther, M., Poor, N., 2006. Modeling air/sea flux parameters in a coastal area: a comparative study of results from the TOGA COARE model and the NOAA buoy model. Submitted to *Atmospheric Environment* in February 2006.

TBNEP, 1996. Charting the Course: The Comprehensive Conservation & Management Plan for Tampa Bay. Tampa Bay Estuary Program (formerly Tampa Bay National Estuary Program), St. Petersburg, FL. Document available for download from [www.tbep.org](http://www.tbep.org).

Tesche, T. W., Wilkinson, J. G., Loomis, C. F., McNally, D., 2000. Ozone modeling protocol for the peninsular Florida ozone study, version 1.0, AG-TS-90/170, Alpine Geophysics, LLC, Ft. Wright, KY.

USEPA, 1998a. A Comparison of CALPUFF Modeling Results to Two Tracer Field Experiments. EPA-454/R-98-009. Office of Air Quality Planning and Standards, Research Triangle Park, NC.

USEPA, 1998b. A Comparison of CALPUFF with ISC3. EPA-454/R-98-020. Office of Air Quality Planning and Standards, Research Triangle Park, NC.

USEPA, 2006a: Final 2002 National Emissions Inventory (NEI).  
<http://www.epa.gov/ttn/chief/net/2002inventory.html>. Accessed April 23, 2006.

USEPA, 2006b: Toxic Release Inventory Program. <http://www.epa.gov/tri/>. Accessed April 23, 2006.

USEPA, 2006c: Clean Air Progress and Reports. <http://www.epa.gov/airmarkt/emissions/prelimarp/index.html>. Accessed April 23, 2006.

Venegas, L., Hannaway, G., Poor, N., 2002. An evaluation of the errors associated with the loss of puffs at the boundary of the CALPUFF modeling domain, *Proceedings of the AWMA's 95<sup>th</sup> Annual Meeting & Exhibition*, June 23-27, 2002, in Baltimore, MD.

Yegnan, A., Garrison, M., Joshi, S., Sherwell, J., 2003. Estimation and analysis of long-term trends in nitrogen deposition using CALPUFF, paper # 70408. *Proceedings of the Air & Waste Management 96<sup>th</sup> Annual Conference and Exhibition*, June 22-26, 2003, San Diego, CA.

### **C. SUBMITTAL OF APPLICATION**

Please submit a total of five (5) applications (one original and four (4) copies / one of which must be in electronic format as a CD) to:

Environmental Protection Commission of Hillsborough County  
Environmental Resources Management Division  
Attn: Tom Ash / Pollution Recovery Fund  
3629 Queen Palm Dr., Tampa, Florida 33619

***Completed applications must be received at the above address by  
5:00pm (EDT), May 1, 2006.  
Late applications and email applications will not be considered.***

[www.epchc.org](http://www.epchc.org)

E-Mail: [epcinfo@epchc.org](mailto:epcinfo@epchc.org)

AN AFFIRMATIVE ACTION – EQUAL OPPORTUNITY EMPLOYER

## **PRF APPLICATION PROCESS**

### Instructions

The Hillsborough County Environmental Protection Act (Chapter 84-446, Laws of Florida) has created a pollution recovery fund which is to be supervised and used by the commission to restore polluted areas of the county, as defined by the commission, to the condition they were in before pollution occurred, to mitigate the effects of pollution, or to otherwise enhance pollution control activities within the county.

#### **Application Forms must be submitted on or before the May 1, 2006 deadline.**

- There will be a newspaper advertisement, and possibly press releases, specifying the deadline for submitting applications.
- Application forms and instructions can be obtained from Tom Ash, phone 813-627-2600 x1011 or from our website at: [www.epchc.org](http://www.epchc.org)
- Except under special circumstances, applications submitted earlier than the deadline will be held until the next processing period, and then processed with the others.

#### **Following the deadline, applications will be distributed to staff appropriate to the project for review and recommendation to the Executive Director.**

- Staff may contact the applicant upon beginning review, and if a meeting to discuss details is requested or advisable, will schedule it.
- Staff will meet with the Executive Director to discuss all applications in the group and to prioritize and determine recommendations.

#### **A summary of the Executive Director's recommendations will be forwarded to CEAC along with copies of all applications.**

- Staff will send a copy of the Executive Director's recommendations to each applicant along with a notice of the meeting date at which CEAC will discuss the applications and its recommendations to the EPC Board.
- Applicants are invited to attend the CEAC meeting and make a brief presentation in support of their project.

#### **Staff and CEAC recommendations will be presented to the Commission for decision.**

- The EPC Board meeting will likely be the second meeting following the CEAC meeting so that the information can be properly placed on the agenda.
- The Applicant may attend the EPC meeting and request to speak.

#### **If the project is approved, the applicant must sign a contract before monies will be available.**

- EPC Legal will draft the contract with standard terms and conditions, and provide it to the applicant for review and execution.
- EPC Legal will arrange for execution of the contract by the EPC Chair after it is executed by the applicant, and will then forward final copies to the Applicant's Project Manager and the EPC Project Manager.
- The EPC Project Manager will be responsible for ensuring the applicant's compliance with the contract.