Final Meeting Summary

Fourth Meeting of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force

June 30-July 1, 1999
Cook Convention Center
Memphis, Tennessee

The Mississippi River/Gulf of Mexico Watershed Nutrient Task Force (Task Force) met on June 30-July 1, 1999 in Memphis, Tennessee. The meeting was chaired by Charles (Chuck) Fox, Assistant Administrator for Water, U.S. Environmental Protection Agency (EPA).

The objectives of the meeting were to provide the Task Force and the public with the conclusions of the six Gulf of Mexico hypoxia science assessment reports and to discuss any comments received. The Task Force also needed to agree on the schedule for completion of both the Integrated Assessment of the science reports and the subsequent Action Plan.

Wednesday, June 30, 1999

Opening Remarks

Chuck Fox opened the meeting by welcoming the public and introducing new Task Force members: Patty Judge, Secretary of Illinois Department of Agriculture who attended this meeting; Bradley Campbell, Council of Environmental Quality and William Leary, Department of Interior Fish, Wildlife, and Parks, who will attend future meetings. He then explained the role of the Task Force in relation to the new Harmful Algal Bloom and Hypoxia Research and Control Act of 1998 (HABHRCA). The roles of the Task Force and Coordination Committee are to develop the Action Plan, in cooperation with stakeholders, and present it to Congress and the President.

Mr. Fox explained that prior to the convening of the current State-Tribal-Federal Task Force; several Federal agencies met a number of times to consider causes of and responses to the Gulf hypoxia problem. These agencies initiated a peer-reviewed scientific assessment of six aspects of this issue. Six teams of government and academic scientists undertook this task.

Don Scavia, Senior Scientist for NOAA's National Ocean Service, addressed concerns from the states on their limited participation in the science assessment process. He explained that the reports were now in the public comment period phase until August 2, 1999, and gave the Internet address for accessing the six reports (http://oceanservice.noaa.gov/products/pubs_hypox.html#Reports).

Don Pryor, Office of Science and Technology Policy, then explained how the Gulf of Mexico hypoxia assessment and Action Plan relate to the other elements of HABHRCA. He discussed the timeline for products required by the legislation and listed all the members of the Federal Agency HABHRCA Task Force.

Conclusions of the Six Science Assessment Reports

Each team leader presented the findings from his/her respective science assessment reports and addressed questions and comments from the Task Force and the public. Copies of overheads or slides used in the presentations are available upon request to supplement the summary.

Topic Paper #1: ***Characterization of Hypoxia***

Presented by Nancy Rabalais, Louisiana Universities Marine Consortium

Team 1 was charged with describing the seasonal, interannual, and long-term variation in hypoxia in the northern Gulf of Mexico and its relationship to nutrient loading. Dr. Rabalais reviewed the extent of the zone of hypoxia in the Gulf of Mexico, which from 1985-1998 ranged from 8,000 km^2 to 18,000 km^2 and extended from shallow depths near shore to up to 60 meters deep in off shore waters from late spring through late summer. The two main causes of hypoxia are the physics of the Gulf system itself (temperature and salinity stratification within the waters of the Gulf) and an overload of nutrient delivery (nitrogen and phosphorus). Nutrient delivery to the Gulf of Mexico comes primarily from the Mississippi and Atchafalaya River discharges. There is a relationship between the distance from the river and the amount of nutrients found in the water. The amount of nutrients discharged to the Gulf influences the productivity of phytoplankton. The nutrient most relevant to overall phytoplankton production in the Gulf is nitrogen. Nitrate-nitrogen makes up about two-thirds of the total nitrogen input from the Mississippi River.

Dr. Rabalais then discussed the sources of the data that were used to consistently measure the hypoxic zone. The earliest data set was collected in 1985. In 1993, a large flood year for the Mississippi River, the zone doubled in size and all factors were greater. In 1995 through 1997, the distribution was generally the same. She explained that there has been hypoxia since consistent measurements began in 1985 in the Gulf, but that it has never been to the degree that it is now. Hydrographic data that documents hypoxia in the Northern Gulf of Mexico dates back to the early 1970’s.

Examination of shelled animal remains in sediment cores dating back to the 1900's and as far back as the 1700's can be used to document historic conditions of oxygen stress. Results of these studies indicate some evidence of oxygen stress at the turn of the century and an acceleration of worsening oxygen stress since the 1940's-1950's period. Dr. Rabalais then presented several research needs. The most important is for continued monitoring of what is currently in place to develop a long-term data set to determine relationships with changing river constituents and loads.

Topic Paper #2: ***Ecological and Economic Consequences of Hypoxia***

Presented by Robert Diaz**,** Virginia Institute of Marine Science.

Team 2 evaluated the ecological and economic consequences of nutrient loadings in the Gulf of Mexico including the impacts on fisheries and the regional and national economy. Dr. Diaz stated that hypoxia is a serious problem not only in the Gulf of Mexico, but exists around the world in developed areas. In all cases, effects include a loss of biodiversity and a change to the food webs. Like all ecosystems there is not one particular aspect of the Gulf of Mexico system that is the controlling factor in the hypoxia problem. The current conditions of the biota in the Gulf are the result of a very complex series of interactions between different stressors, including eutrophication, fishing activities, flow changes, oil and gas related activities, sea level and climate changes, and seasonal summertime hypoxia.

The team's evaluation of the ecological data available indicates that the shallow continental shelf ecosystem area affected by hypoxic conditions is stressed. An evaluation of the economic data on fisheries failed to detect changes which are specifically related to hypoxia. Dr. Diaz's team focused on eutrophication and seasonal summertime hypoxia. Eutrophication is the primary response of the system to receiving nutrients from the Mississippi River, which increases production of organic matter. This has resulted in relatively high fisheries landings over the last 30 years, which can be directly linked to the primary production of the system. The problems result when there is too much of a good thing. Too much organic matter leads to depletion of oxygen and hypoxic conditions. The effects of hypoxia are most obvious in the benthic organisms (worms and clams) that have no commercial value, but are elements of the food web on which commercially important species may depend. There is no obvious hypoxia-related effect in the fisheries as a whole, but data show virtually no catch in areas suffering from hypoxia. Dr. Diaz then discussed four categories of response in the ecosystem, including stressed fisheries, lost fisheries, loss of biodiversity, and a change in the way energy is processed (i.e., a change in the food pyramid).

Looking at other hypoxic areas around the world, as the hypoxic area becomes larger or more severe; the ecological and economic effects become more obvious. His team found that in areas where there are huge hypoxic zones, such as in the Baltic Sea, there are mass mortalities at the fishery level and that the hypoxia lasts all year long. The Gulf of Mexico is a unique coastal system in that it has managed to show signs of recovery following the hypoxic event and maintain energy flow to productive crab and shrimp fisheries that depend on the bottom habitat. However, if the hypoxic conditions worsen, then at some point fisheries species will decline precipitously.

Question and Answer Session [Answers in ( )'s]

Task Force

Questions raised by Task Force members on the Team 1 and 2 reports dealt with variations in nutrient runoff from year to year (Team 3 will present); evidence of a correlation between indicators for existing sediment and the change in flow (Correlation is between the amount of nitrogen flux and the river's flow); nutrients and carbon in the sediments - already existing or they are added (not already existing - correlations consistent with additions of nutrient since the 1950s); effects on organisms below 60 meters in the hypoxic areas (shrimp move away at one mile per day and travel further offshore when hypoxia is not present); smaller size of fishery area related to hypoxic area (difficult to speculate especially when using "catch per unit effort"); and differences between normal and flood year (there was a response after the 1993 flood which had carryover effects).

Public

Questions and comments raised by the public concerned definitions for landings, landings versus stock data, and what States were covered (landings data were more representative and the statistical groups included increase in the amount of fisheries, menhaden, and water column species in specific zones off the coast of Louisiana and Texas); and the loss of wetlands as a cause of major effects in the Gulf (**ACTION** - Obtain Louisiana's Coastal (20/50) Report from Len Bahr and distribute to the Task Force); consider the Mississippi River as a resource and learn from its history.

Topic Paper #3 ***- Flux and Sources of Nutrients in the Mississippi-Atchafalaya River Basin***

Presented by Donald Goolsby**,** United States Geological Survey

Team 3 identified the sources of nutrients within the Mississippi/Atchafalaya River Basin system and within the Gulf of Mexico focusing on two components, first the geographic location of the most significant nutrient additions, and second, the relative importance of specific human activities in contributing to these loads. Mr. Goolsby provided information on the amounts and sources of nutrient flux (total nitrogen, nitrate-nitrogen, orthophosphate and total phosphorus, and dissolved silica) to the Gulf of Mexico from the Mississippi and Atchafalaya River Basins. His team used stream flow and concentration data for 9 large basins and 42 smaller interior basins to get yields to determine the loadings to the Gulf of Mexico.

Mr. Goolsby presented information on the trends of nitrate flux over the years. From 1955 to 1970, the average annual flux of nitrate was 328,000 metric tons per year. From 1970 to the mid 1980s there was an upward trend; however from the mid 1980s to 1990 the flux levels off with no trend indicated. The team found no real trends in phosphorus or silica fluxes from the early 1970s to 1996. However, the silica concentration has decreased from the 1950s until about the 1970s. This decrease may be associated with dilution of silica concentrations from an increase in stream flow or removal of dissolved silica by increases in diatom production in the Mississippi River resulting from increases in nitrogen concentrations. Mr. Goolsby stressed that there was variability in the data according to the amount of rainfall each year.

Focusing on the nitrogen results, the group concluded that Iowa and Illinois each contribute about 16 percent of the total nitrogen flux entering the system. Indiana, Ohio, Missouri and Minnesota each contribute from 6 to 9 percent, and Kentucky, Louisiana, Mississippi, Tennessee, Wisconsin, Arkansas, and Kansas each contribute 2 to 5 percent of the total nitrogen. Each of the rest of the states in the basin contributed less than 2 percent. Mr. Goolsby then discussed the influence of specific human activities on nitrogen flux. In their report, Team 3 listed the sources in the basin and their relative inputs:

- Fertilizer and soil mineralization (50% +/-9)
- Runoff (including atmospheric deposition, groundwater, and soil erosion, etc.) (24% +/-6)
- Animal manure (15% +/-10)
- Industrial and municipal point sources (11% +/-2)

Mr. Goolsby stated that most of the nitrogen input in the system is used up by harvested crops. The remainder is volatilized from fertilizer, denitrified, used by plants, or immobilized in the soil by microorganisms. The team developed an input/output mass balance model to estimate the amount of nitrogen that is left over and how that residual amount has changed over time. They discovered that the residual has actually decreased over time probably due to greater efficiency in agricultural practices. The team also compared their model with several models already developed, including a multiple regression model and the USGS SPARROW model. The conclusions reached by the input/output model were very similar to results obtained through these other models.

Topic Paper #4 ***- Effects of Reducing Nutrient Loads to Surface Waters within the Mississippi River Basin and the Gulf of Mexico***

Presented by Joseph DePinto, State University of New York for the Gulf of Mexico, and Patrick Brezonik, University of Minnesota, for the Mississippi River Basin

Team 4 estimated the effects of nutrient source reductions in the Mississippi-Atchafalaya Basin on water quality, and on the primary productivity and hypoxia in the Gulf of Mexico. Dr. DePinto assessed the relationship between nutrient loading to the Gulf of Mexico and water quality impacts in terms of chlorophyll production and dissolved oxygen in the Gulf using a mass balance model. The Team's objectives were to investigate whether dissolved oxygen and chlorophyll concentrations are sensitive to changes in the Mississippi-Atchafalaya Basin nitrogen and phosphorus loadings, and to estimate the magnitudes of potential reductions in these loadings that might be necessary to improve present water quality conditions, especially seasonal hypoxia.

Team 4 found that dissolved oxygen and chlorophyll concentrations on the Louisiana Inner Shelf would appear to be responsive to reductions in nutrient loadings from the Mississippi-Atchafalaya River. However, there are large uncertainties in the magnitudes of these responses for a given nutrient loading reduction. These uncertainties are due to lack of information on controlling physical, chemical, and biological processes, and to natural variability in hydrometeorological conditions in the northern Gulf of Mexico. For nutrient loading reductions of 20 to 30 percent, bottom water dissolved oxygen concentrations were estimated to increase by 15 to 50 percent and surface chlorophyll concentrations were estimated to decrease by 5 to 10 percent.

Dr. Brezonik then presented information on the effects of nutrient source reductions and the effects of changes in nutrient concentration on ecological and water quality conditions within the Mississippi River Basin. Dr. Brezonik discussed the kinds of data that the team had available to them to reach their conclusions. They focused particularly on agricultural sources because it is the most important source in the system. There are many management practices that can decrease nutrient runoff from10 to 90 percent, but the success of the practices is not viable everywhere.

One of the Team's most important findings was the significance of precipitation on nutrient export from land and fertilizer. When precipitation is low, the export of nitrogen from the system is not highly effected by over fertilization, but when precipitation is high there is a large effect. However, if fertilization rates are at the recommended agronomic levels, even when precipitation is high the increase in loss is not much greater than the loss at lower precipitation. On the other hand, over fertilization allows up to a hundred percent loss of nitrogen.

The estimates of in-stream loss were based on a nationally calibrated SPARROW model using approximately 400 stream monitoring stations in US rivers, of which there were about 120 stations in the Mississippi River basin. Although the model estimates describe the average in-stream N loss for US rivers, the rate coefficients would include the effects of many rivers in the Mississippi River Basin. The SPARROW rate coefficients are also empirically derived, and are not based on published estimates of loss that have been reported for selected rivers in Europe and North America.

Dr. Brezonik then discussed the benefits of lower nutrient concentrations on ecosystem and water quality by their examination of potential for decreased frequency of violations in water quality standards related to nutrient conditions in the Mississippi River Basin; the potential reductions in biochemical oxygen demand; the decreased exceedance frequencies of nutrient concentration criteria related to river eutrophication; the effects on plankton composition and production, and nuisance algal blooms; the effects on macrophyte communities; and effects on fish communities. The analysis was limited to evaluating narrative standards since the only numerical standard for nitrate is a drinking water standard (10 mg/L), which is far greater than the level of nitrate that causes eutrophication. Similarly, the ammonia standard is based on toxicity to fish and is not directly related to eutrophication problems. Decreases in nitrogen and phosphorus concentrations in the freshwater part (particularly the Upper Mississippi) of the basin would result with an increase in underwater light penetration. This would cause an increase in submerged aquatic macrophytes which would benefit the water and ecosystem quality, both locally, in terms of improved habitat for fish, and system-wide in terms of increased nutrient retention in the river system. Decreases in nutrient concentrations would have little effect on the sport fisheries in the Mississippi River Basin.

Team 4 concluded that nutrient loss processes for agricultural lands differ substantially for nitrogen and phosphorus. Nitrogen is more associated with subsurface drainage. Phosphorus is more associated with soil and runoff. Therefore, the options for loss reductions must be considered separately for nitrogen and phosphorous and for the location at which reductions would occur. Although nitrogen is the main problem in the Gulf of Mexico, phosphorus cannot be ignored since they are closely correlated. The team estimated that a 30 percent reduction in median total phosphorus would be required in the Upper Mississippi, Arkansas-Red, and Missouri regions to obtain a 10 percent reduction in the hydrologic cataloging units (HCUs) that exceed the trophic criterion. A 15 percent reduction of total phosphorus in the lower Mississippi, Tennessee, and Ohio subbasins would have the same 10 percent reduction effect.

Question and Answer Session [Answers in ( )'s]

Task Force

Questions and comments raised by Task Force members on the Team 3 and 4 reports dealt with whether greater benefit is gained in freshwater with phosphorus controls (for phosphorus reductions through point source controls are already established, but nonpoint sources still need to be addressed); nitrogen versus phosphorus versus light limitations in the Gulf (since light limits the rate of growth of organisms and not the amount of biomass achieved, the amount of biomass can be reduced by limiting nitrogen or phosphorus); effects in freshwater on commercial fishing in the MRB (did not think there are many commercial fisheries in MRB, however there are not models to quantify declines in total fish production); and urban, suburban and rural use of fertilizer (between 5 and 20 percent of the total fertilizer sales is for nonagricultural uses).

Public

Questions and comments raised by the public concerned differentiation between nitrogen in soil organic matter and fertilizer loading (unable to differentiate between the two in terms of output to the river); measurement of effects of sediment load on turbidity (not done in the analysis); analysis of light attenuation, chlorophyll *a* production, and changes in sediment loads as a result of dam and reservoir systems (for offshore waters, less turbidity coupled with higher nutrient loads result in higher chlorophyll *a*); and availability of historic data to indicate waters now impaired by nutrients could meet designated uses (probably could, but data not available and there is no reason to believe that nitrogen concentrations were as high 150 years ago as they are today).

Working Session at Mud Island River Park

The Task Force and interested meeting attendees met at Mud Island River Park. The session included a self-guided tour of the Mississippi River Museum and the River Walk, a 5-block long replica of the lower Mississippi River. After the tour, attendees had dinner at the Museum's facilities along with a training session given by John Barry, author of *Rising Tide: The Great Mississippi Flood of 1927 and How It Changed America.* Mr. Barry gave a provocative talk on how attempts were made to "control" the Mississippi River. He discussed the history of flooding along the river, especially the effects of the 1927 flood. Mr. Barry asserted that the key error of the brilliant engineers, who were addressing navigation and flooding in the Mississippi River in the post-Civil War period, was their inability to alter their theories of river dynamics when confronted with clear empirical evidence of the fallacy of those theories. He urged the Task Force members to base their actions on the data at hand even if it conflicts with prevailing opinions.

Thursday, July 1, 1999

Topic Paper #5 ***- Reducing Loads, Especially Nitrate-Nitrogen, to Surface Water, Groundwater and the Gulf of Mexico***

Presented by Bill Mitsch, Ohio State University

Team 5 identified and evaluated methods to reduce nutrient loads to surface water, ground water and the Gulf of Mexico. Dr. Mitsch discussed the approaches, options, and recommendations for reducing nitrate-nitrogen loads into the Gulf of Mexico from the Mississippi River Basin. For their report, the Team made three assumptions associated with nitrogen reduction: nitrogen is the limiting factor in the Gulf, any reduction in loading in the Mississippi River Basin will lead to corresponding percent decrease in nitrogen loading to the Gulf, and the problem needs to be resolved.

Given those three assumptions, Team 5 investigated seven options to reduce nutrient loads in the basin: onsite control of agricultural drainage, such as changing cropping systems; offsite agricultural nonpoint source control, such as the use of wetlands and buffer strips; urban nonpoint source control; point source control; control of atmospheric nitrogen; diversions of the Mississippi River into its delta; and upper Mississippi River flood control/restoration.

One of the approaches Dr. Mitsch recommended for nitrogen reduction was changing farm practices. A combination of practices including better nitrogen management, reduced fertilizer use, "smarter" manure use, and alternative cropping systems will improve the condition of the Gulf. An additional approach concluded that from 5 to 13 million acres of wetlands and riparian buffers would need to be created/restored in the Midwest to reduce nitrogen loading and control flooding.

Dr. Mitsch also discussed additional issues to consider for reducing nitrogen in the Mississippi River Basin. These included scale effects; comparisons of "apples and oranges;" system delay and buffering; agricultural production; other nutrients; long-term prognosis; catastrophic events such as floods; uncertainty of ecotechnology (the use of ecologically based solutions); and climate change and the greenhouse effect. Recommendations for reducing nitrogen loads in the Gulf of Mexico were:

- Implement on-farm practices that include a 20 percent reduction in nitrogen fertilizer application, other fertilizer management procedures, use alternative crops, wider spacing of subsurface drains and better management of livestock manure--these practices should lead to reductions of 15-20 percent in nitrogen field losses.
- Restore or create 5 million acres of wetlands and 19 million acres of riparian buffers (or some other combination of the two) in the Mississippi River Basin.
- Restore wetlands and riparian zones to optimize nitrogen retention/loss, i.e., they should be placed where they will achieve the greatest benefit.
- Establish a formal policy of tertiary treatment for nitrogen at all new municipal wastewater treatment plants in the Mississippi River Basin.
- Revisit restoration of flood-prone lands in the Upper Mississippi.
- Reduce nitrogen as part of flood diversions in the Mississippi River in Louisiana.
- Implement current reductions of atmospheric nitrogen, because further reductions are not warranted to protect the Gulf of Mexico.
- Couple any nitrogen mitigation efforts with a comprehensive monitoring, research, and modeling program.

Dr. Mitsch described additional advantages or benefits which would be realized with implementation of the Team's recommendations. These included local water quality improvements, particularly for drinking water protection; meeting of national goals for wetland restoration; enhancement of river ecology; enhancement of terrestrial wildlife; reduction of flood damages and flood disaster payments; and reduction of other pollutants besides nitrogen.

Topic Paper #6 ***- Evaluation of Economic Costs and Benefits of Methods for Reducing Nutrient Loads to the Gulf of Mexico***

Presented by Otto Doering, Purdue University

Team 6 evaluated the social and economic costs and benefits of the methods identified by Team 5, which included an assessment of various incentive programs and anticipated fiscal benefits generated for any implementation actions resulting in nitrogen reductions. Dr. Doering discussed the economic cost of nitrogen reduction in the Mississippi River Basin through the implementation of several management practices, including managing atmospheric deposition (from automobiles and large utility plants), manure, and fertilizer.

To analyze economic effects for various scenarios, Team 6 mathematically modeled hypothetical farms in the basin using the United States Mathematical Programming Model (USMP) for agriculture. Along with the USMP, they also estimated environmental indicators with the EPIC biophysical model which uses information of soils, weather, and management practices, including specific fertilizer rates and produces information on crop yields, erosion, and chemical losses to the environment. With the models, they analyzed the reduction of nitrogen inputs to the farm by a given percent, while at the same time maintaining profitability on the farm. The driving force was to keep farm profits as high as possible— conducting activities that represent the least cost to the farmer to get the desired result. In the model, the hypothetical farmer is allowed to reduce the amount of nitrogen used, ensure that the nitrogen is applied during recommended times, change crops, change tillage systems, or give up a field that has a high nitrogen loss. The Team recognized that anything done in the basin with regard to agriculture will have impacts outside the basin.

Dr. Doering explained that the model was used to estimate the changes in agricultural prices, land use, and exports, and run using various nitrogen reduction scenarios. A 10 percent nitrogen reduction did not show much of a change; however a 20 percent nitrogen reduction affected prices, land use, and exports. At a 20 percent nitrogen reduction, corn acreage within the basin decreases 1.3 percent, while a 60 percent nitrogen reduction results in a 26 percent decrease in corn acreage, severely impacting prices, incomes, and exports. Those farmers that are left in the system maintain fairly high incomes, but if corn acreage is reduced by 26 percent— that 26 percent of corn acreage is not yielding an income for some farmers. As the system is "squeezed down," land use changes, operation costs increase, prices increase, and consumers pay higher prices for food. A 20 percent net loss of nitrogen was determined to be the point where no changes occur in export incomes, land use, or prices that were outside the historical experience of agriculture in the 10 years prior to the 1996 Farm Bill. Beyond 20 percent, changes occur that are outside of historical experience.

Dr. Doering then discussed the cost and benefit outcomes which differ based on the scenario evaluated. For costs, prices will initially increase and benefit those farmers within the basin, however they will suffer in the long run through reduced yield due to reduced land use. Also, a potential cost from decreased agricultural export volumes that depends upon the level of nitrogen restriction. Livestock operators will incur higher costs because corn and protein costs increase. When management practices are carried out to reduce nitrogen, there is also a reduction in soil erosion and phosphorus loss. However, as soil erosion decreases within the basin, the rest of the U.S. farmers cultivate more intensively to compensate for the high prices, resulting in potential environment problems. Team 6 did not attempt to evaluate alternative implementation strategies or mechanisms to accomplish the alternative nitrogen reduction levels it modeled (i.e., voluntary, mandatory, incentive driven, etc.).

For benefits, Team 6 found that greater benefits can be attained when farmers are allowed to implement several nutrient reduction practices at the same time. Wetlands are economically costly when compared to the cost of fertilizer reduction, however when the additional benefits such as wildlife habitat improvement, improved water quality, flood control, and recreation are considered, the net (environmental and economic) cost of the wetlands goes down. A 20 percent nitrogen loss reduction is achievable with a strategy combining a 5-million acre wetland restoration with a 20% fertilizer reduction in appropriate locations in the Mississippi River Basin.

Question and Answer Session [Answers in ( )'s]

Task Force

Questions and comments raised by Task Force members on the Team 5 and 6 reports included clarification of what fertilizer baseline was used for the 20 percent reduction (based on the agronomic rate; **Post Meeting Note - the actual application rate using survey data was used as the baseline, not the agronomic rate**); recognize that whether or not nitrogen reduction improves hypoxia, it has other benefits, but that the Federal government should be funding the reduction benefits and provide technical assistance (need to address fact that all policy goals cannot be met with existing staff writing all nutrient management and other plans); whether the new USDA-developed insurance policies make a dent in paying for conservation practices (not enough pilot projects to find out what works); and effects of implementation of Total Maximum Daily Loads (TMDLs) on the Gulf (cumulative effects of TMDLs would need further research, although TMDLs alone probably will not cure the hypoxia problem).

Public

Questions and comments raised by the public on the Team 5 and 6 reports included impacts on the hypoxic zone under normal, higher than normal, and lower than normal conditions after the 20 percent reduction in nitrogen loss (model showed that 20 percent reduction will result in a proportional decrease in hypoxia); point sources should be analyzed differently than nonpoint sources because they discharge directly into streams; sediment and nutrient loading problems exist, but need to be addressed at the local level not for such a large watershed; the report process seems to be headed towards regulation without fixing the hypoxia problem which would have worldwide impacts agriculturally and ecologically, therefore a voluntary approach with incentives should be considered; concern about data presented and the relative rise and fall of hypoxia during different precipitation rates; fact that as the population grows more food will need to be produced; consideration of benefits of carbon sequestration value of timberland as opposed to farm clearing; many more models could be used to estimate economic effects of nutrient reduction including international growth in crop acreage; and there should be a cost for any use of a natural resource by industry.

Integrated Assessment and Action Plan Preparation /Schedule

Bob Wayland**,** Director of EPA's Office of Wetlands, Oceans, and Watersheds, discussed a proposed schedule for the Integrated Assessment and the Action Plan. The Integrated Assessment will incorporate recommendations of the six science reports. There will be a 60-day comment period on the draft Integrated Assessment. For the Action Plan he suggested that the Coordination Committee pick-up the pace of meetings and conference calls to shape straw proposals for consideration by the Task Force by October 1999. There will be other Task Force meetings at the end of March 2000, and in August 2000 when the Action Plan is completed.

Task Force discussion followed and included expectation that the Action Plan would be developed through a consensus process; that all Task Force members needed to provide input on the Integrated Assessment which will help develop the Action Plan; that policy issues will be addressed in the Action Plan and not in the Integrated Assessment; that consideration be given for adequate time for public input and that the public and private interests be engaged during the process; acceptance/support by Congress of late products; State versus subbasin versus watershed goals; and consideration of other reports recently published, i.e. Council for Agricultural Science and Technology (CAST) report and another sponsored by the Fertilizer Institute. One member of the public requested an extension in the comment period for the six reports for another 30 days and the chair noted there would be additional comment opportunities on the Integrated Assessment and the Action Plan.

The Task Force agreed the next meeting will be in a city in the Mississippi River Basin in October or November.