FLORIDA ASSOCIATION for WATER QUALITY CONTROL

June 14, 1992

Dear Attendees:

As Chairman of the Florida Association for Water Quality Control, it is my pleasure to welcome and thank you for participating in the 15th annual conference. There is a very exciting technical program planned for this year, and I'm sure you'll be pleased with the quality of the presentations.

The conference committee elected to change the format this year, and has arranged two very timely workshops for your participation. We hope you will take advantage of this opportunity to experience the most recent technological developments in water management. Environmental issues are in the foreground of this decade's concerned society, and "Water Pollution Prevention" is a key issue. This is a perfect opportunity to stay abreast of what is occurring in the water industry.

In addition, there are many other activities planned outside of the technical sessions. Please plan to attend and enjoy the company of your friends and colleagues.

I would especially like to thank the members of the planning committee for their dedication and cooperation. Many hours of hard work have been donated by the members so that you will have a technical conference that is beneficial to your career.

Sincerely,

Glori Ann Snow

Glori Ann Snow
Chairman

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I

MEETING AGENDA AND TECHNICAL PROGRAM

FAWQC

AGENDA OF EVENTS

SUNDAY, JUNE 14, 1992

8:00 - 4:00	Vendor Registration and Setup
10:00	Tennis Tournament - Registry
1:00	Golf Tournament - Lely Golf Course 8002 Lely Resort Boulevard, Naples, Florida
3:00 - 6:00	Registration
7:00	Cocktail Social

FAWQC
Technical Session
Groundwater and Pollution Prevention

MONDAY, JUNE 15, 1992

7:00 - 8:00 Registration and Continental Breakfast

8:00 - 8:15 Opening remarks - Glori Ann Snow, Chairman

PROGRAM **Moderator: John Garlanger, Ph.D.**
Ardaman & Associates

I. Groundwater and Pollution Prevention

A) 8:15 - 8:45
Francis K. Cheung, P.E., Herbert G. Stangland, P.E. and W. Winston Chen - Ardaman & Associates - "Wellfield Planning Using Wellhead Protection Models"

B) 8:45 - 9:15
Jack Kuhn and David Kriz - Soil Conservation Service - "Reducing Agricultural Chemicals Entering the Groundwater by Using Improved Management Practices"

C) 9:15 - 9:45
Tom Patka, J.D. - Holland & Knight - "Legal Aspects of Pollution Prevention"

BREAK: 9:45 - 10:30 Visit Vendor Exhibitions

D) 10:30 - 11:00
David Moore, P.G. - Southwest Florida Water Management District - "Overview of SWFWMD Needs and Sources Plan"

E) 11:00 - 11:30
Kent Zaiser, J.D. - Foley & Lardner - "Issues Affecting Groundwater in the 1990's"

F) 11:30 - 12:00
Robert Fox and Jefferson Petersohn - Geraghty & Miller - "Engineering Techniques for Source Containment as a Means of Groundwater Protection"

G) 12:00 - 12:30

Gail Gibson, Ph.D, P.G. - Collier County Pollution Control Department - "A Review of the Collier County Groundwater Protection Ordinance"

LUNCH: 12:45 - 2:00

KEYNOTE SPEAKER: Roberta Savage, President
America's Clean Water Foundation
"1992 - The Year of Clean Water"

II. Groundwater Workshop

H) 2:15 - 5:00
Richard M. Powers, P.G. and Philip R. Davis, P.G. -
Bromwell and Carrier, Inc., and Schreuder & Davis, Inc.
"GIS/Surfacewater/Groundwater - An Integrated Model:
The FIPR Hydrologic Model"

SOCIAL HOUR: 6:30 - 7:00

BANQUET: 7:00 - ??
Entertainment by "Fall Guys and a Gal"

FAWQC
Technical Session
Surface Water and Pollution Prevention

TUESDAY, JUNE 16, 1992

7:00 FUN RUN - Registry (To the beach and back)

7:45 - 8:45 Registration and Continental Breakfast

PROGRAM **Moderator: Richard Garrity, Ph.D.**
Department of Environmental Regulation
Tampa District Office

I. Surface Water and Pollution Prevention

A) 8:45 - 9:15
Ken Ford and Joel Butler - Seminole Fertilizer - "Surface Water Pollution Prevention by Sawgrass Revegatation"

B) 9:15 - 9:45
Tom French - Post, Buckley, Schuh & Jernigan, Inc. - "Atrazine in South Florida Surface Waters"

C) 9:45 - 10:15
Allen Burdett and Frank Courtney - Florida Department of Environmental Regulation and Florida Marine Research Institute - "Pollution Prevention by Restoration of Impacted Wetlands"

BREAK: 10:15 - 10:45 Visit Vendor Exhibitions

D) 10:45 - 11:15
John Wiley - Monsanto - "Spill Prevention to Protect Surface Waters"

E) 11:15 - 11:45
David Walker - St. Johns River Water Management District - "Restoring part of the Oklawaha River and Floodplain at Sunnyhill Farm"

F) 11:45 - 12:25
Veronika Thieback, J.D. - Legal Environmental Assistance Foundations, Inc. - "Surface Water Pollution Prevention from a Legal Standpoint"

LUNCH: On your own

II. Surface Water Workshop

G) 1:45 - 4:30
Theodore Penland, Jim Heuer, Dart Morales, and Bruno A. Ferraro, CEP
Blankenship & Associates, Inc., American Sigma, Inc.,
and Grove Scientific Co.,
"NPDES/Stormwater Field Sampling"

II

ABSTRACTS AND BIOGRAPHICAL INFORMATION

WELLFIELD PLANNING USING WELLHEAD PROTECTION MODELS

by

Francis K. Cheung, P.E., Herbert G. Stangland, P.E.
and W. Winston Chen*

Ardaman & Associates, Inc.
P.O. Box 593003
Orlando, FL 32859

ABSTRACT

In Florida, protection of groundwater resources to ensure a safe, economic, long term supply of drinking water is a major concern. The State and local governments are developing wellfield protection programs. This paper addresses wellfield planning through use of wellhead protection models. The well capture zone concept is introduced. Different approaches for delineation of wellhead protection areas are presented. The Wellhead Protection Area (WHPA) Model, as promulgated by the United States Environmental Protection Agency, will be emphasized. Input data or site information required for wellhead protection analysis are detailed. Interpretation of results of wellhead protection modeling are presented. Important factors that can affect the shape and dimension of wellhead protection areas are highlighted. Model assumptions and limitations are summarized. Finally, methods for delineation of resource protection areas are presented. A good understanding of site hydrogeology and groundwater flow patterns for proper wellfield planning are emphasized throughout this paper.

KEYWORDS

Wellfield; wellfield planning, capture zone analyses; wellhead protection; water supply; aquifer protection; resource protection; groundwater protection.

Model Available through GeoTrans, Inc.

* Senior Project Engineer, Senior Water Resources Engineer and Assistant Project Engineer, respectively

REDUCING AGRICULTURAL CHEMICALS ENTERING THE GROUND WATER BY USING IMPROVED MANAGEMENT PRACTICES

by

Jack Kuhn[1] and David Kriz[2]

Soil Conservation Service
Gainesville, Florida

ABSTRACT

Sustainable agriculture in harmony with a quality environment is the goal of the agricultural community.

The local, state and federal agencies in partnership with the agricultural producers believe a five step approach can be used to accomplish this goal.

- An intense education campaign, targeting the landuser, that focuses on pesticide selection and application.
- Sound agricultural planning using state-of-the-art technology, including: Ground Penetrating Radar and Geographical Information Systems.
- Identification of sink holes, paleo - sinks and limestone areas with direct access to the aquifer.
- Using Erosion Control Measures to reduce pesticide and nutrient movement from site to the aquifer.
- Providing financial incentives to landusers for installation and maintenance of the Improved Management Practices.

Using this five step approach will provide the following:

- Application of pesticides in an efficient and environmentally sound manner.
- Replacement of pesticides with high leaching potential by those with low leaching potential.

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[1] Water Quality Specialist
[2] GIS Manager — Use GRASS

- Reduction of agricultural runoff entering the aquifer through wells and other natural connections to the aquifer.

- Reduction in the potential for agriculture runoff to degrade ground water and surface water resources.

BIOGRAPHY

Jack Kuhn has worked for SCS in seven locations throughout Florida during the past 11 years. Jack started as a co-op student in 1981 and since has held positions as soil conservationist in Martin and Palm Beach counties, district conservationist in Holmes County, and area resource conservationist in Jackson County. Jack currently holds the position of state water quality specialist in the Gainesville state office.

Jack is a native of Florida and holds a degree in Agriculture from the University of Florida. He is a member of the Soil and Water Conservation Society and is president elect of the Florida Chapter.

David Kriz began working with the Soil Conservation Service in 1980. He joined SCS as a soil scientist in Parker, Arizona, after graduating from New Mexico State University with a degree in Agronomy-Soil Science.

Since then David has held several Soil Scientist positions in Arizona and Florida including Area Resource Soil Scientist in the Orlando area. He currently serves as the GIS Manager at the State Office in Gainesville.

In addition, David is a Certified Professional Soil Scientist by the American Registry of Certified Professionals in Agronomy, Crops and Soils; a member of Soil Science Society of America and a member of the Florida Association of Professional Soil Classifiers and served as vice-president, 1988-90.

LEGAL ASPECTS OF POLLUTION PREVENTION

by

Thomas J. Patka, J.D.

Holland & Knight
Tampa, Florida

ABSTRACT

Two important federal rules that will soon go into effect will have a significant impact on pollution prevention of surface waters and ground waters: (1) the Environmental Protection Agency's new Stormwater Rule, and (2) the much anticipated revision to EPA's Hazardous Waste Mixture Rule. Discussion will focus on both the anticipated permitting impacts in Florida and some effects of these rules on how companies manage their waste products.

Stormwater Pollution Protection Plan

OVERVIEW OF SWFWMD NEEDS AND SOURCES PLAN

by

David Moore, P.G.

Southwest Florida Water Management District
Brooksville, Florida

ABSTRACT

A needs and sources analysis is presented for the Southwest Florida Water Management District (SWFWMD) as required by rule 17-40 of the Florida Administrative Code. The purpose of the Plan is to provide the framework for management of water supply development in SWFWMD through the year 2020. This Plan examines water demands and resources for the period 1990 through 2020. SWFWMD can be divided into three major ground-water basins.

Three major policies guide SWFWMD's Needs and Sources Plan. The first is that local sources will be developed to the greatest extent practicable prior to importing water from a distant source. For example, utilities shall develop the resource within their service area prior to pursuing distant sources. The second is that conservation is considered a source of new water to reduce existing demand and to meet further needs and will be aggressively pursued by SWFWMD through Chapter 40D-2. The third is that all future public supply sources developed outside the service area will be developed and operated by the appropriate regional water supply authority.

In no way does this Plan guarantee that every projected demand will be met. In fact, unless greater than anticipated conservation occurs, it is unlikely that all projected demands will be met. Rather, this plan identifies areas where demand has the potential of outstripping available resources, and recommends appropriate strategies, including limiting withdrawals, to avert critical water supply problems.

It should be noted that critical water supply problem areas already exist in SWFWMD and are being addressed through two sister efforts: (1) the designation of these areas as Water Use Caution Areas (WUCAs) and the associated resource management measures; and (2) Water Resource Assessment Projects (WRAP's) which are designed to determine the safe yield of these areas. There are three critical water supply problem areas: the Northern Tampa Bay WUCA, the Eastern Tampa Bay WUCA, and the Highlands Ridge WUCA.

1.6 BGP Now
2.4 " Future. 30 yr.
Cons 130 GPD/CAPITA

6 Months To Rules with N+5's.

LEGAL ISSUES AFFECTING GROUNDWATER IN THE 1990s

by

Kent A. Zaiser, J.D.

Foley & Lardner
Tallahassee, Florida

ABSTRACT

The Water Resources Act of 1972 and subsequent case law irrevocably altered the reasonable use of water doctrine under the common law in Florida. The water management districts and the three-part test for consumptive use of water have increased in the importance under present circumstances. Massive population growth in urban and coastal areas has changed historical land use and created competing demands for limited supplies of groundwater. New limitations on use in certain areas of high demand may result in severe reductions of permitted quantities, special conditions or denial of consumptive use permits. Data collection, conservation techniques and interdistrict transfers have new meaning. Needs and sources plans will dictate the nature and location of future sources. As a result, water management district governing board appointments, policy and rulemaking are becoming more critical to consumptive use regulation.

BIOGRAPHY

Kent A. Zaiser is a partner in the Tallahassee office of the law firm of Foley & Lardner. He graduated from Duke University and received his law degree from the University of Florida. He was a Research Aide and Administrative Assistant to the Chief Justice of the Florida Supreme Court from 1973-76; Assistant General Counsel for the Florida Department of Natural Resources from 1976-80; Assistant Attorney General in the Federal Civil Litigation Section of the Florida Department of Legal Affairs from 1980-85 specializing in environmental and natural resources law; and Deputy General Counsel and General Counsel for the Southwest Florida Water Management District in Brooksville from 1985-92. He is a member of the Environmental and Land Use Law Section of the Florida Bar.

ENGINEERING TECHNIQUES FOR SOURCE CONTAINMENT AS MEANS OF GROUND-WATER PROTECTION

by

Robert Fox and Jefferson Petersohn

Geraghty & Miller, Inc.
Tampa, Florida

ABSTRACT

Engineering techniques for source containment as a means of ground-water protection can be divided into two general categories: 1) Proactive Techniques and 2) Reactive Techniques.

Proactive techniques are specifically designed to protect ground-water quality by physically or chemically containing hazardous materials or process waste materials. These engineering techniques can be effective for containment, if and only if, the systems are designed, constructed, and operated correctly. Examples of designs for above and below ground tanks containment systems will be presented.

Reactive techniques are designed to mitigate the degradation of ground-water quality by minimizing the generation of leachate caused by surface waters infiltrating through wastes or contaminated soils. Such engineering techniques for containment of existing waste materials or contaminated soil include: 1) Liner Systems; 2) Soil Covers; 3) Multimedia Cover Systems; 4) Slurry Walls; 5) Subsurface Drains; 6) Hydraulic Barriers; and 7) Stabilization/Solidification Methods. Examples of designs for source containment of exiting wastes or contaminated soils will be presented.

The selection of appropriate engineering techniques for source containment as a means of ground-water protection has become increasingly more complex on both State and Federal levels. Feasibility studies are typically conducted to evaluate the effectiveness, implementability, and costs for alternative techniques. For projects dealing with large quantities of wastes or contaminated soils such a feasibility study may include the following considerations:

- Treatability Studies;
- Pilot Scale Testing;
- Risk Assessments;
- Modeling; etc.

Ultimately, the feasibility study is intended to result in selection of engineering techniques which are protective of ground-water quality while meeting the constraints of a given site and project.

A case history summarizing the selection of a remedial alternative for a Superfund site will be presented. The strategy for the development of clean up levels for each remedial alternative were calculated using remedy/site specific input for the model. The effectiveness of a clay soil cover with stabilization of all sludges and soils above the required clean -up level were compared to the effectiveness of a RCRA cover with stabilization of sludges only. The RCRA cover minimizes infiltration and flux of leachate generation thereby eliminating the requirement for stabilization of soils while providing remedial alternative that provides an effective means of ground-water protection.

A REVIEW OF THE COLLIER COUNTY GROUND WATER PROTECTION ORDINANCE

by

Gail G. Gibson, Ph.D., P.G.
Senior Hydrogeologist

Pollution Control Department
Collier County
Naples, Florida 33962

ABSTRACT

To meet state and local mandates, the Ground Water Protection Technical Advisory Committee and the Pollution Control Department staff, with the assistance of the contracted legal firm of De la Parte and Gilbert and geotechnical consultant, Hunter-Hydrosoft, Inc., prepared the Collier County Ground Water Protection Ordinance. The purpose of this Ordinance is to protect the quality of the County's ground water resource from contamination from sanitary, petroleum products, and hazardous product and hazardous waste sources, especially in the areas of contribution to public water supply wellfields. On 6 November 1991, the Collier County Board of County Commissioners unanimously approved the Ordinance.

The process of developing the Ordinance was predicated on the geologic and hydrogeologic conditions of Collier County. The geologic units are not homogeneous either vertically or horizontally and consequently impact the ground water system differently across the County. The risk management aspect of wellfield protection was (is) difficult to assess because of this lack of vertical and lateral homogeneity. More than 80 percent of the potable water supply for Collier County residents is derived from these heterogeneous units, whose recharge is largely via direct infiltration from the surface.

The protection philosophy of the Ordinance is predicated on contamination concerns, growth planning for the County, and on providing some measure of Countywide protection along with wellfield protection. A 20-year planning horizon was initially selected from which wellfield risk management areas were established around public water supply wellfields. Computer modeling utilized this planning horizon as the modeling limit for the zone of contribution to each wellfield. Some ordinances established risk management zones as concentric circles around wellfields with the radii of the circles predicated on ground water and/or contaminant travel time or utilized property boundaries. The hydrogeologic conditions in Collier County are not amenable to either of these delineation methodologies.

Hunter-Hydrosoft, Inc. developed a three-dimensional (3-D) computer model of ground water flow to each of ten (10) identified public water supply wellfields in Collier County. The models provide technically/legally defensible interpretations of vertical and horizontal

ground water movement of other wellfields, reflecting geologic and hydrogeologic conditions of the County. Input data for the model included: projected water demands to the 20-year planning horizon; maximum allowable pumping rates from the wellfields; aquifer parameters; and various boundary conditions.

The model generated a regional ground water flow interpretation and from that developed flow models for each of the identified wellfields. The flow pattern for each wellfield is unique, with the 20-year planning horizon representing the 100% ground water contribution limit. Within that 100% contribution area, the 5%, 10%, and 25% contribution areas closest to the wellheads were delineated. These percentages were translated to map lines that define the approximate outer extent of the 1-, 2-, and 5-year contaminant particle travel times from the wellhead.

The map lines that were then generated delineate Wellfield Risk Management Zones W-1, W-2, W-3, and W-4. W-1 addresses concerns over hazards generated from sanitary sources and has the most stringent land use regulations. Restrictions within Zones W-2 and W-3 address the concerns of discharges of Hazardous Products and Hazardous Waste or other hazardous materials and are less stringent than in Zone W-1. Zone W-4 provides for the least restrictive land usages, recognizing time/technology available to initiate and complete remediation before a contaminant can reach the wellhead.

BIOGRAPHY

Since 1990, **Dr. Gibson** has served as the Senior Hydrogeologist for the Pollution Control Department in Collier County, Florida. She holds B.S., M.S., and Ph.D. degrees in Geology and is licensed as a Professional Geologist in the State of Florida. Dr. Gibson taught at the University level and conducted research in North Carolina, New Mexico, Texas, Ohio, and Alabama. Additional research projects were done in South Carolina, Arizona, West Virginia, and Florida; Mexico; Quebec and Newfoundland, Canada. She has worked as a petroleum and mineral exploration geologist for ARCO and Gulf Minerals in Louisiana, Texas, New Mexico, and Arizona and established a consulting firm specializing in the Chihuahua Tectonic Trend of West Texas and adjacent Mexico. She is author or co-author of 40 publications or abstracts.

SURFACE WATER POLLUTION PREVENTION BY SAWGRASS WETLAND MITIGATION

by

Ken Ford and Joel Butler

Seminole Fertilizer Corporation
Bartow, Florida

ABSTRACT

This program reviews the hydrology and construction methods which resulted in the rapid growth and development of sawgrass. Surface water quality in this award winning project is also discussed.

ATRAZINE IN SOUTH FLORIDA SURFACE WATERS

by

Tom French

Post, Buckley, Schuh & Jernigan, Inc.
Orlando, Florida

ABSTRACT

As part of an ambient surface water monitoring program with the South Florida Water Management District, Post, Buckley, Schuh & Jernigan (PBS&J) detected Atrazine in surface waters. The District decided to implement a more intensive study to specifically look for this widely used herbicide. As the District had a limited budget for this study, PBS&J investigated an alternative method using Solid Phase Exchange coupled with High Pressure Liquid Chromatography technology to provide an accurate, sensitive and relatively inexpensive analytical tool for use in this important study. To date the analytical results have not been correlated with other environmental factors, however results are consistent with average values obtained in other areas of the United States.

POLLUTION PREVENTION BY RESTORATION OF IMPACTED WETLANDS

by

Allen Burdett and Frank Courtney

ABSTRACT

The Department of Environmental Regulation, Department of Natural Resources, the SWIM Department of the Southwest Florida Water Management District, and other agencies are working together and coordinating with local governments to restore, create and enhance natural wetland systems.

DER's Pollution Recovery Trust Fund, DNR's Marine Habitat Research and Enhancement Program financed by the Gill Net license fees, and Legislative funding of the SWIM Program have provided funding for major improvements in the Tampa Bay Estuary. Sarasota Bay and Tampa Bay National Estuary Programs have also provided new projects and funding support.

Estuarine ecosystems are relatively easy to restore and enhance; however, the availability of public or private lands where improvements can be made is limited. Fortunately the cooperation among local governments, the private sector and the agencies has been excellent, and public acquisition of lands around the bay is providing new opportunities for restoring and enhancing estuarine systems.

The removal of spoil banks, the creation of shallow water habitats and wetlands, improvements in tidal circulation, the removal of debris and exotic vegetation are some of the measures that have been taken to improve natural productivity and filtration of tidal waters. Particular emphasis has been given to restoring wetland systems in the low salinity tributaries of the bay due to the importance of these areas in providing needed nursery habitat for marine fisheries and for the treatment of stormwater runoff.

BIOGRAPHY

Allen Burdett (Forestry Tech., B. A. Botany) has worked for DNR and DER as a Marine Biologist and Environmental Specialist from 1968 to present. He is currently an Environmental Restoration Coordinator in the Tampa District of the Department of Environmental Regulation.

Frank Courtney (M.S. Marine Science)is a Biologist with the Marine Habitat Research and Enhancement Program at the Florida Marine Research Institute in St. Petersburg.

SPILL PREVENTION TO PROTECT SURFACE WATER

by

John G. Wiley
Environmental Health and Safety Superintendent

Monsanto Chemical Company
Pensacola, Florida

ABSTRACT

Monsanto has employed a Total Quality Management approach to the reduction of accidental releases or spills that have the potential to impact surface waters. This effort began three (3) years ago when a corporate committee was appointed to develop an accurate spill reporting procedure and to recommend methods to reduce the total number and severity of spills. This work led to the formation of a Total Quality Improvement Team of diverse employees dedicated to reducing spills at the plant site. The team has employed a number of novel approaches to spill reduction, primarily revolving around employee awareness and behavioral modification concepts. This was based on the fact that over 29 percent of all spills were directly related to human error. The results of the team's effort to date have been very successful in reducing the overall number and severity of spills. This has not only enhanced compliance with the plant's surface water discharge permits, but has moved the plant closer to its ultimate goal of zero spills and zero net impact on the environment.

BIOGRAPHY

John G. Wiley is the Environmental, Health, and Safety Superintendent at Monsanto Chemical Company's plant in Pensacola. The Pensacola plant is Monsanto's largest plant and the world's largest wholly unified nylon facility. John has held various assignments in manufacturing and in the support services areas during his 20 years with the company. John received a B.S. degree in Industrial Engineering from Auburn University and completed course work toward his masters in System Management from F.I.T. in Melbourne. Prior to joining Monsanto, John was a System Engineer with Harris Corporation in Melbourne. John has been responsible for Monsanto's environmental program for the past 10 years and has been recognized by his corporation for his proactive approach with the regulated community.

RESTORING PART OF THE OKLAWAHA RIVER AND FLOODPLAIN AT SUNNYHILL FARM

by

David Walker, Field Program Manager

St. Johns River Water Management District
Palatka, Florida

ABSTRACT

The St. Johns River Water Management District (SJRWMD) has identified acquisition and restoration of muck farm properties as critical features of the Upper Oklawaha River Basin - SWIM program. Reduction of nutrient loading to surface waters from muck farm drainage; habitat restoration; re-establishment of functions such as nutrient filtration and flood storage; and new recreation opportunities are benefits expected from these projects. At Sunnyhill Farm, the SJRWMD has already begun clearing the old channel of the Oklawaha River in preparation for the long-term restoration of this property. Completion of the final project could occur as early as July 1994.

WATER POLLUTION PREVENTION FROM A LEGAL STANDPOINT

by

Veronika Thiebach, J.D.
Environmental Justice Fellow

Legal Environmental Assistance Foundation, Inc.
Tallahassee, Florida

ABSTRACT

The presentation will:

- Provide an overview of the Federal Pollution Prevention Act of 1990 and accompanying regulations;
- Discuss any statutes or regulations of the State of Florida or at the Federal level that mandate or could mandate pollution prevention;
- Make recommendations for legal reform to encourage, and create incentives for businesses to practice pollution prevention.
- Present a survey of measures taken by other states in this area.

III

KEYNOTE SPEAKER

KEYNOTE SPEAKER

ROBERTA HALEY SAVAGE

Ms. Savage is the President and Board Chair of America's Clean Water Foundation (ACWF). As such, she spearheaded the adoption of the Congressional and Presidential Resolution declaring 1992 as "The Year of Clean Water" and is responsible for assuring the implementation of the Foundation's mission to Commemorate the Twentieth Anniversary of the Clean Water Act (1992). As a part of the commemoration, ACWF promotes better environmental science, increased public awareness and enhanced public stewardship of our nation's waters. Under her leadership, the Foundation focuses on five program areas:

- Citizen Involvement/Awareness,
- Youth Education,
- Innovation and Technology Exchange,
- National Status and Trends Analysis, and
- National Celebration

In addition to her role with the Foundation, Ms. Savage is also the Executive Director and the Secretary-Treasurer of the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) a position she has held since January of 1979. ASIWPCA, established in 1961, is the national professional organization of State managers of this nation's surface and groundwater quality programs.

Over her many years in the water field, Ms. Savage has served on a host of national advisory boards and commissions as well as receiving many awards, honors and certificates. Ms. Savage's work has been published extensively in the national and trade press, education texts, and scientific journals. Ms. Savage has also appeared on numerous science and policy related television programs which include the MCNEIL/LEHRER REPORT, CAPITOL JOURNAL, WASHINGTON WEEK, C-SPAN, CNN, USIA'S INTERNATIONAL TELELINK CONFERENCES, and many more.

Ms. Savage currently serves on the Secretary of the Interior's Blue Ribbon Panel for Take Pride in America, Keep America Beautiful's National Advisory Board, and the USEPA Administrator's Environmental Financial Advisory Board and the USEPA's Management Advisory Group. In addition, Ms. Savage is this year's recipient of the *Herschel C. Loveless Award for Environmental Achievement in the Public Sector* presented by the National Environmental Development Association (NEDA).

Ms. Savage has three grown children and was educated at the University of Utah and Harvard University.

IV

WORKSHOPS

GIS/SURFACEWATER/GROUNDWATER - AN INTEGRATED MODEL: THE FIPR HYDROLOGIC MODEL

presented by

Mr. Richard M. Powers, P.G.
Executive Vice President

Bromwell & Carrier, Inc.
Lakeland, Florida

Mr. Phillip R. Davis, P.G.
Vice President

Schreuder & Davis, Inc.
Tampa, Florida

ABSTRACT

In May of 1988, the Florida Institute of Phosphate Research (FIPR), located in Bartow, Florida, embarked on a four year research project to develop a state-of-the-art computer model that would accurately predict the hydrologic impacts of phosphate mining on surface and groundwater systems. The goal of the research project was to develop a user friendly, interactive hydrologic model that would serve as the standard for evaluating future hydrology permitting activities between the phosphate mining industry and local and state regulatory agencies. The model will provide reclamation planners, engineers, and hydrogelolgists a tool to assess pre- and post-mining surface water discharge rates and the groundwater data necessary for reestablishing stream base flow and surface water systems, planning wetland and marsh reclamation projects and predicting water table levels in the surficial aquifer.

The core of the FIPR Hydrologic Model (FHM) is a highly analytical geographic information system developed by TYDAC Technologies Inc. called "SPANS", which stands for Spacial Analysis System. The GIS portion of the model enables a user to digitally store, display and manipulate geographical data such as soils maps, topographic elevations, aquifer levels, and land use. The GIS performs overlay functions which are used to conduct spacial analysis of the various geographic information to generate model input parameters such as slope and soil infiltration. The GIS data is then utilized in the hydrologic model preprocessors to develop the data files needed to conduct sophisticated hydrologic modeling.

The models incorporated into the FHM consist of EPA's Hydrology Simulation Program - FORTRAN (HSPF), which is a surface water model and the McDonald-Harbaugh groundwater model (MODFLOW) as the basis for hydrologic analysis. In addition, an evapotranspiration (ET) model was also incorporated into the model to better estimate daily and total ET. These three models working with the GIS system allow a user to conduct either event or continuous annual hydrologic simulations for most areas within the state of Florida. Currently, a user is able to step through the GIS portion of the model in approximately 2 hours and complete an annual simulation of a project area within 2 to 3

hours. Event simulations generally are completed in about 5 minutes utilizing a 386 computer running at 25 MHZ.

During the research project, extensive data gathering and calibration activities were completed to develop the appropriate ranges and default values necessary to automate the hydrologic model. A total of 23 sites were monitored for different types of landforms and vegetation and that data then used to calibrate the model. Typical data collected and analyzed consisted of ET, precipitation, surface water runoff and base flow, stream stage, infiltration rates, soil types and physical characteristics and aquifer levels and characteristics.

The FHM represents a major advancement in hydrologic modeling by linking a GIS, surface water, groundwater, and evapotranspiration model. Users of the model are able to conduct event simulations for any specific type of rainfall event and are also able to run continuous annual simulations using various annual temperature and precipitation data. With the FHM it is possible to analyze groundwater and surface water conditions on an annual basis for a range of climatic conditions ranging from a cold, wet year through a hot, dry year.

The model also provides the user with a tremendous amount of analytical data based on a specific grid pattern. A typical question which can be addressed by the model is, "Will this designed wetland contain enough water to support the types of vegetation selected for reclamation?" Utilizing the continuous annual simulation, the hydrologist can develop point water level elevation data for each of 52 weeks and then assess if the appropriate hydroperiod is maintained for a successful wetland reclamation project. In addition, base flow to streams can be assessed and design changes made prior to reclamation activities to best yield a productive, environmentally compatible reclamation design.

The consulting team responsible for development of the FIPR hydrologic model consisted of Bromwell & Carrier, Inc., Lakeland, Florida; University of South Florida College of Engineering, Tampa, Florida, Schreuder & Davis, Inc. of Tampa, Florida and Dr. S. Snedaker of the University of Miami.

SURFACE WATER WORKSHOP

presented by

Workshop Chairman: Francis L. Corden
Senior Scientist

Geraghty & Miller, Inc.

Speakers:

Mr. Theodore Penland, Blankenship & Associates, Inc.
Mr. Jim Heuer, American Sigma, Inc.
Mr. Dart Morales, Vice President, Grove Scientific Co.
Mr. Bruno A. Ferraro, C.E.P., President, Grove Scientific Co.

PART 1: REGULATORY OVERVIEW OF THE STORM-WATER PERMIT RULE

This section will present a brief discussion of the regulatory basis for the Storm-Water Rule including the preamble to the rule published in the Federal Register, Volume 55, Number 222, page 47990. A review of the permitting requirements will be conducted with emphasis placed on identifying regulated outfalls and the list of regulated constituents that require monitoring. An update of the current deadlines associated with submission of Part 2 of the permit application will also be provided.

PART 2: AUTOMATED SURFACE-WATER SAMPLE COLLECTION TO MEET THE STORM-WATER RULE REQUIREMENTS

This section will discuss the initial steps necessary to identify the scope of your sample collection effort. Planning steps include selection of applicable outfalls and representative sampling points for each outfall, identifying the flow characteristics of each outfall, and identifying minimum requirements for rainfall intensity and duration. The methods for generating rainfall data, and procedures for collection of first flush samples and composite samples also will be discussed. The session will close with a demonstration of automated equipment for collection of the storm-water samples required by a typical permit. Specific emphasis will be placed on flow meter calibration, rain gauge operation, sampler set-up and testing as well as data collection and subsequent downloading.

PART 3: MANUAL COLLECTION OF SURFACE-WATER SAMPLES

This section will discuss basic surface-water sampling protocols. Information on the required reference documents, minimum quality assurance program requirements, and field documentation, will be provided. The specific difficulties associated with collecting storm-event samples will be addressed. Various types of manual surface water sampling equipment will be discussed and selected items will be available for hands-on demonstrations for interested attendees.

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PROJECT TITLE: RECLAIMED WATER'S IMPACT ON THE FLORIDAN AQUIFER: A TWO-YEAR STUDY

BIOREMEDIATION - A THREE-YEAR STUDY

By: **Joseph D. Robinson**
Senior Section, Environmental Sciences, Indian River Region
Teacher: G. Anderson, Vero Beach Senior High School, Vero Beach, Florida

ABSTRACT

It was hypothesized that if naturally occurring microbes could be cultured and utilized for bioremediation purposes, then they may be compared favorably to commercially produced microbes. River water and sediments were collected from the bottom of the Indian River Lagoon. The muck and water were combined in plastic containers along with crude oil and fish emulsion. One container was kept tightly closed to promote anaerobic bacterial growth while the other was left open for aerobic bacterial growth. The containers were shaken daily for thirty days to simulate tidal movements and promote bacterial growth. Cultures were prepared in a portable hood and grown on nutrient agar plates in a small incubator. After ten days of growth, specific microbes were isolated and grown in the same conditions. After a further ten days, the specific microbes were enriched in a riverwater/crude oil/fish emulsion media for six days. Cultures were prepared on nutrient agar plates and grown in an incubator for five days. Specific colonies were isolated and grown in the same conditions for eight days. The ten samples along with three commercially prepared microbe samples were used in three tests. Test number one compared the effectiveness of the different microbes using different water types: seawater, riverwater, artesian (sulphur) water and well water, both in natural and sterile conditions. Test number two compared variations in oil degraded based on temperature controls. Test number three compared the effectiveness of the different microbes at different depths.

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ASSESSING THE QUALITY OF WATER IN NORTH BAY

By: **Grant R. Claussen**
Junior Section, Environmental Sciences, Three Rivers Region
Teacher: S. Howell, Jinks Middle School, Panama City, Florida

ABSTRACT

The purpose of this project was to determine the levels of coliform bacteria, dissolved oxygen, chlorophyll *a*, nitrogen, and phosphorus present in North Bay, Panama City, Florida. Water samples were taken monthly from three bayous.

The level of fecal coliform was calculated using the direct membrane filter method, performed by a water analysis laboratory. The level of dissolved oxygen was calculated using a dissolved oxygen test kit. Chlorophyll *a*, nitrogen, and phosphorus levels were determined by a laboratory at the University of Florida.

Quantitative testing results for fecal coliform varied from <2 to 1600 colonies per 100 ml, revealing that in some areas the level of fecal coliform was hazardous. Dissolved oxygen levels varied in range from 5.9 to 9.1 ppm. No correlation could be formulated between dissolved oxygen and coliform levels in this study. Chlorophyll *a*, nitrogen, and phosphorus levels indicated that phosphorus was the major nutrient limiting the growth of marine plant life and chlorophyll *a* was present in below-normal amounts.

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THE RECONNECTION VIABILITY OF THE LOST CREEK ESTUARY SYSTEM

By: **Sean J. Lyman**
Senior Section, Environmental Sciences, Tomoka Region
Teacher: M. Aumiller, Spruce Creek Senior High School,
Port Orange, Florida

ABSTRACT

Sometime prior to 1943, the dredging of the Intracoastal Waterway in the Halifax River in Volusia County, Florida, sealed the mouth of a small tidal creek. To determine the changes that have occurred in Lost Creek, it was compared to another tidal creek just to the north, Ten Mile Creek, in the areas of biological diversity, shoreline vegetation, and water quality. It was hypothesized that Lost Creek would prove a relatively invital system.

It was found that species diversity was almost as high in Lost Creek as in Ten Mile Creek and that there was no significant difference between Lost Creek and Ten Mile Creek in the water quality parameters measured. Shoreline vegetation and water quality parameters indicated that Lost Creek had changed from a system based on decaying plant mass to a system based on photosynthetic production.

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RECLAIMED WATER'S IMPACT ON THE FLORIDAN AQUIFER: A TWO-YEAR STUDY

By: **Alicia F. Smith**
Junior Section, Environmental Section, Seminole Region
Teacher: P. Wilson, Rock Lake Middle School
Altamonte Springs, Florida

ABSTRACT

The use of reclaimed water for irrigation can have a significant impact on the preservation of the Floridan aquifer.

Two experiments were performed. The first experiment used forty plants (nursery plants, cuttings, and seeds), divided equally among four different groups of water (rain, bottled, reclaimed, and potable), to test which water group yielded the best results in growth and overall appearance. I recorded appearance conditions daily, and took height measurements and irrigated the plants weekly.

The second experiment involved testing each type of water for the concentration levels of nitrates and phosphates. Tests were performed weekly during the same time period the plants were irrigated. The LaMotte Nitrate-N Phosphate Test Kit was used to perform these tests.

The reclaimed water test group of plants grew the greatest in height, and had the best overall appearance. The one exception was the group of seeds, whose growth results indicated the need for further experimentation.

Reclaimed water measured highest in nitrates, followed by rain water. Rain water measured highest in phosphates, followed by reclaimed water. The results; however, were disappointing. The concentration of nitrates and phosphates in the waters were, most of the time, unreadable. Better results can only be obtained by using a spectrophotometer.

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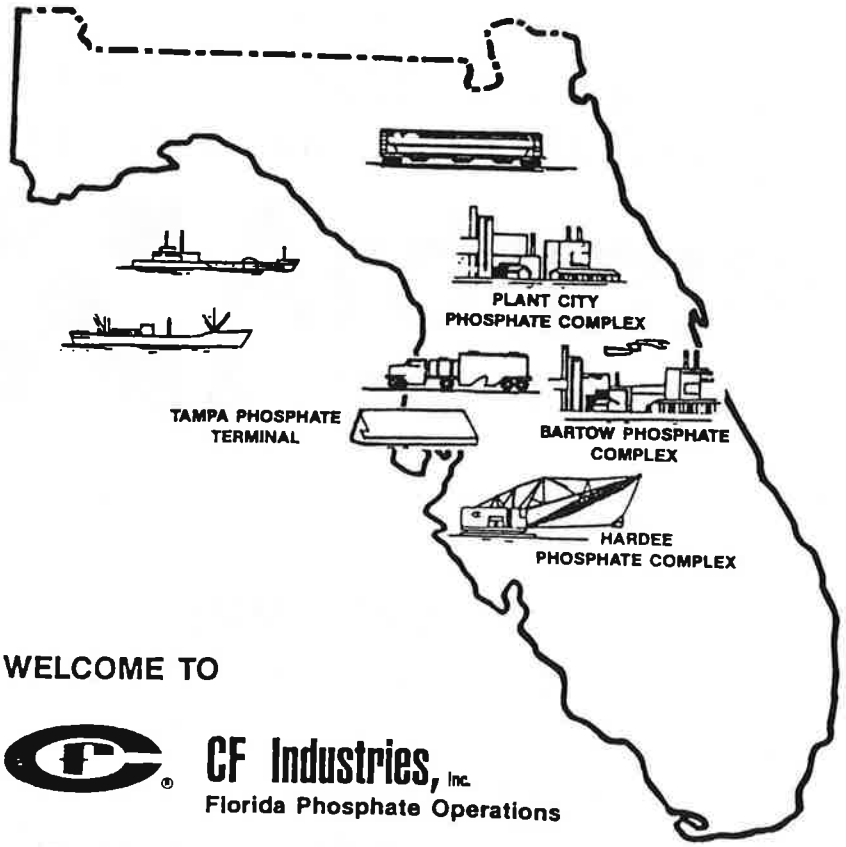

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