A Progress Report on actions taken to protect Southeast Florida's only source of drinking water—The Biscayne Aquifer
The Biscayne Aquifer

Why It is Important to Southeast Florida

All residents in Southeast Florida depend on one source of clean drinking water, the Biscayne Aquifer. Lying directly under the urban area of Miami, this source of water for almost 3 million people is only several feet below the surface. Water from the Everglades and rain over the general area seep into the porous soils of Southeast Florida as into a sponge and enter the aquifer. This groundwater then moves slowly eastward toward Biscayne Bay and the Atlantic Ocean.

The Biscayne Aquifer is a wedge-shaped formation that is less than 10 feet thick at its thinnest point west of Dade County. The figure below shows the shape of the Biscayne Aquifer. It slopes eastward, increasing in depth until it is 80 to 150 feet thick under Miami.

Close to the surface, the aquifer is covered by only a thin layer of soil. This plentiful resource provides over 400 million gallons of water to Southeast Florida's residents each day. The water is directly under the places where people live, work, and play, and can be easily tapped for use. While this is convenient, this also creates a problem.

Because residents live, and industries and developments are built literally on top of the water supply, anything that spills on the ground enters directly into the aquifer, contaminating Southeast Florida's only source of drinking water. Contamination can come from many sources:

- Waste from industrial activities
- Water running off roads and parking lots
- Chemicals and fuels leaking from storage tanks
- Motor oil and chemicals used at home
- Pesticides and fertilizers used in agriculture
- Seepage from landfills
- Leakage from sewer lines and septic tanks
- Hazardous waste from Superfund sites

A Side View of the Aquifer

The Biscayne Aquifer lies under Dade County. Varied layers of porous limestone rock contain water that supplies over 400 million gallons of water for area residents each day.
Contamination from any of these sources can easily enter the Biscayne Aquifer if not controlled or disposed of properly.

In fact, two large water supply wellfields in the area studied by EPA have been closed since 1982 because of contamination entering the Biscayne Aquifer. To replace wells that were closed, the Northwest Wellfield, located west of the developed areas of Dade County, was placed into operation in 1984. This wellfield now supplies over 40 percent of Dade County's drinking water.

To protect the area's sole source of drinking water, in the mid-1970's Dade County gave the Department of Environmental Resources Management (DERM) the authority to control and regulate activities that could contaminate the aquifer. By the late 70's, Dade County began acting on the results of numerous technical studies funded by EPA to implement programs to protect the Biscayne Aquifer. These programs were funded by Dade County. Public drinking water supplies received special attention in 1981 with the creation of the first wellfield protection program in the country. The Wellfield Protection Program—as well as county-wide programs—has steadily improved as a result of local, state, and federal efforts, becoming one of the country's most effective groundwater protection programs.

Activities that Contaminate the Groundwater

- Liquid Waste Hauling
- Uncontrolled Hazardous Waste Sites
- Agricultural Practices
- Leaking Storage Tanks
- Landfills
- Airport Operations
- Industrial Waste Disposal
- Household Hazardous Waste and Motor Oil Disposal
- Lawn Fertilizer/ Household Pesticides Disposal

Activities at the surface of the Biscayne Aquifer can easily contaminate Miami's drinking water.
Dade County is thought by many to be a tropical paradise. It is a land of warm offshore breezes and water—ocean, bays, canals, and rivers. However, it is also a very fragile environment. Dade County residents' dependence on the Biscayne Aquifer for an ample supply of clean water, combined with the aquifer's vulnerability to contamination, highlights our need to manage and protect the natural resources on which we all depend.

Recognizing this, Dade County created the Department of Environmental Resources Management (DERM) in 1976, taking over an earlier, more limited county organization. "Many activities and programs have now been set up to protect, manage, enhance, and restore Dade's natural resources," said Anthony Clemente, former Director of DERM and now Assistant County Manager. "Protecting the Biscayne Aquifer from contamination is one of our highest priorities."

To accomplish its goals, DERM has set up five divisions as described in the box to the left. With only 250 employees at DERM working to protect all of Dade County’s natural resources, the agency must rely on residents, businesses, and industries for cooperation and help in identifying environmental concerns within the community. The current Director of DERM, John Renfrow, states, "We must continually reestablish in the public mind the relationship between people’s day-to-day activities and the quality of the water they drink."

If you would like information or wish to report a potential problem, call the

DERM HOTLINE: 375-DERM (375-3376)
When officials discovered in the 1970s that Dade County's groundwater supply was being seriously affected by contamination, immediate action was taken to protect the Biscayne Aquifer. Government agencies worked together to head off the threat to Dade County residents' only public water supply. The EPA and DERM forged a unique cooperative relationship. They implemented a series of actions to stop contamination from sources known to be severely contaminating the groundwater.

EPA has established a program called Superfund to clean up toxic chemicals at abandoned disposal sites. Sixteen Superfund sites containing hazardous waste have been identified in Southeast Florida. Because of their combined effect on the Biscayne Aquifer and Dade County's water supply, several of these sites were studied together to identify the best method to clean them up.

In 1981, DERM took action at the Miami Drum Site which was less than 1/4 mile from a major public drinking water supply. DERM removed 9,000 cubic yards of contaminated soil, enough to cover a football field over 5

Sixteen Superfund sites have the potential to affect the Biscayne Aquifer. Three of these sites were studied by EPA as one unit because of their effect on Dade County water supplies.
feet deep. An additional 650,000 gallons of contaminated groundwater were pumped from beneath this facility that was used to clean drums of chemical wastes. The water was then treated to remove contamination and returned to the Biscayne Aquifer. EPA’s Superfund Program paid for the enormous clean-up costs.

At the **Pepper’s Steel and Alloy Site** in Medley, approximately 95,000 cubic yards of contaminated soil were excavated and mixed with a cement-like material. This material was then placed back into the excavation. Once the mixture hardened, contamination was trapped and prevented from entering the aquifer. This action was completed in January 1989.

At the **N.W. 58th Street Landfill**, Dade County constructed a system in 1988 to collect “leachate” that was seeping out of the landfill and dispose of it in public sewers. Leachate is water that seeps through garbage, similar to the way water flows through coffee grounds to create coffee. A comprehensive plan to close the landfill and prevent landfill contamination from seeping into the Biscayne Aquifer is near completion.

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Chemical drums and contaminated soils from the Miami Drum Facility have been removed. Today the site is an active switchyard for the Dade County Metro Rail Transit System.

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Contaminated Soils at the Pepper's Steel and Alloy Site have been solidified and covered with crushed limestone.
# Biscayne Aquifer Protection Plan

## Water Management and Monitoring
- Monitor groundwater near wells
- Determine "safe" levels of contamination in local soil

## Water Treatment and Waste Management
- Provide local waste storage/transfer facility for small waste generators and individuals
- Control handling/disposal by commercial waste haulers
- Construct leak-proof sewers in wellfield protection zones
- Establish tri-county coordinating committee
- Develop spill prevention, control, and countermeasures program
- Pretreat commercial and industrial waste
- Control leakage from existing sewers
- Adopt emergency spill cleanup program
- Review stormwater/wastewater systems

## Land Use Policies
- Regulate land use within wellfield protection zones
- Control groundwater pollution from agriculture

## Environmental Regulation and Enforcement
- Monitor small quantity waste generators
- Improve regulation of small quantity waste generators
- Regulate storage tanks
- Hold responsible parties liable for cleanup costs

## Public Awareness and Involvement
- Develop public awareness/education program
- Encourage public reporting of improper waste disposal
- Collect/recycle used automobile oil from public

Five areas of concern for protecting our water supply have been identified. These have been addressed by EPA's Biscayne Aquifer Protection Plan, which focuses on toxic contamination, and by DERM's more specific Northwest Wellfield Protection Plan.
• Modify canals and levees to isolate the wellfield from existing industrial areas
• Expand canal maintenance to improve interchange between canal water and groundwater
• Protect the Snapper Creek Extension Canal from stormwater runoffs from urban areas and transportation corridors
• Reintegrate Conservation Area 3B into the water delivery system to improve areawide water management
• Invoke mandatory water conservation if necessary to prevent the influx of contamination into the recharge area
• Study and implement water conservation measures in Dade County
• Monitor ground water and surface water around the wellfield
• Change the Wellfield Protection Area based on the monitoring program
• Improve existing county-wide ground water and surface water monitoring system
• Declare urban water conservation district west of the Turnpike

• Install air strippers at the Hialeah and Preston Water Treatment Plants
• Establish hazardous waste collection centers
• Require all new development within the Wellfield Protection Area to connect to public sewers
• Require existing industrial development within all Wellfield Protection Areas to be connected to public sewers
• Improve construction standards for sewers
• Raise requirements and standards for pretreatment of wastewater
• Make equitable the reimbursement of individuals who construct sewers
• Investigate viruses in drinking water supplies

• Discourage urban development within the Wellfield Protection Area
• Allow limestone quarrying within the Wellfield Protection Area to enhance refill of the aquifer
• Develop restrictions on land use in areas surrounding Wellfield Protection Area
• Indicate the Northwest Wellfield and protection areas on county land use maps and Comprehensive Development Master Plan
• Prohibit construction of new lakes within 1/4 mile of the N.W. 58th Street Landfill, United Sanitation Landfill, and Resource Recovery Facility
• Prevent dumping at quarry sites by controlling access
• Limit deep water lakes to 60-day groundwater travel distance and prohibit lake construction in the 30-day zone
• Investigate land uses within the Wellfield Protection Area suspected of contaminating groundwater

• Issue permits for nonresidential uses in the Wellfield Protection Area and conduct inspections
• Improve operations of existing businesses within the Wellfield Protection Area to reduce risk of contamination
• Expedite enforcement process for polluters through ticketing and hearings
• Investigate other ways to encourage compliance with regulations
• Establish a pollution strike force to ensure compliance with regulations
• Streamline the permitting process to consolidate permit and licensing requirements
• Prohibit underground storage of hazardous materials in the Wellfield Protection Area
• Revise Dade County's stormwater disposal practices within the Wellfield Protection Area
• Investigate the transport of hazardous materials through Wellfield Protection Areas, and establish preferred routes

• Increase public knowledge and awareness of environmental resource protection
• Promote Dade County's oil collection and recycling program
• Conduct regularly scheduled “amnesty days” for disposal of household hazardous materials
Miami International Airport is a vital part of our community. It is a major industrial facility that employs thousands of Miami residents. However, activities at the airport have also resulted in the release of a variety of chemicals into the groundwater. Fuel, oil, and a variety of industrial solvents have spilled or leaked into the aquifer during years of airport operation. EPA estimates that 2 million gallons of industrial solvents, chemicals, and fuel have been released since 1966. Because the airport is close to several major water supply wells, DERM and the Dade County Aviation Department (DCAD) took action to recover as much of the contamination as possible. The County installed a series of wells in 1983 to pump out polluted groundwater from under the airport.

As these wells continue to operate today, water is treated to remove contaminants and returned to the Biscayne Aquifer. DCAD has funded most of the cost of recovering more than 320,000 gallons of chemical and fuel contamination. DERM continues to monitor groundwater under the airport and has also taken action to prevent future leaks and spills.

**Other Sources of Contamination**

In addition to these Superfund sites, DERM has identified over 350 sites in Dade County that contain hazardous materials and may threaten the Biscayne Aquifer. Since 1985, 190 of these sites have been cleaned up. Also, hundreds of leaking underground tank sites have been detected. Almost 100 of these sites have been or are in the process of being cleaned up, and the remainder are being assessed.

Two primary sources of contamination to the Biscayne Aquifer include leaking storage tanks and industries that fail to properly dispose of their waste products. To control these sources of contamination, DERM launched a comprehensive permitting program in 1984. The agency phased in the program, allowing local businesses and industries to adjust their operations gradually to comply with DERM’s requirements for safe storage and disposal of hazardous materials.

There are currently six groups required to obtain DERM permits for their operations:

- **Liquid Waste Haulers**
  *Companies that remove infectious, liquid industrial, or hazardous waste from businesses and transport it to a disposal site.*

- **Major Hazardous/Industrial Waste Generators**
  *Operations categorized by EPA as being generators of large amounts of hazardous waste. (Two examples of such operations are chrome plating and aluminum extruding.)*

- **Small Quantity Generators**
  *Small businesses that create over 55 gallons of waste per year.*

- **Storage Tank Operations**
  *Companies that store hazardous materials in storage tanks.*

- **Septic Tank Users Near Municipal Wells**
  *All businesses close to municipal wells that use septic tanks.*

- **Agricultural Point Source Operations**
  *Packing houses, field washing operations, and equipment maintenance facilities.*

DERM inspects all operations that have applied for permits and prosecutes those who attempt to operate without a permit. To date, DERM has issued nearly 7,000 operating permits.

**An Ounce of Prevention Is Worth a Pound of Cure**

Much effort during the past 8 years has focused on cleaning up hazardous waste sites known to be contaminating the Biscayne Aquifer. However, the key to effective protection of human health and the environment is preventing contamination in the first place. When controlling hazardous waste, “the cost of proper disposal may be high, but it is not nearly as high as the cost of cleanup,” said Douglas Yoder, Assistant Director of DERM.

Because of this, a prevention plan is being put into action by DERM, EPA, the Florida Department of Environmental Regulation (DER) and the South Florida Water Management District. In 1985, EPA released a 20-point plan of action called the Biscayne Aquifer Protection Plan. Developed in cooperation with local and state agencies, the plan focused on toxic contamination and identified what should be done to protect the Biscayne Aquifer now and in the future. “If we clean up the pollution problems that exist now, and don’t do anything to stop future problems, our work and the work of all the local groups and agencies will have been wasted,” said EPA Project Manager Jim Orban.

“Nearly all of the actions recommended in the plan have now been enacted.”

(continued on page 10)
Cleanup actions have been taken at EPA Superfund sites in Dade County. A total of nine sites were originally identified by the agency. Four of these are addressed here as examples of efforts underway to protect the Biscayne Aquifer:

For 15 years, Miami Drum Services cleaned chemical waste from metal drums and recycled them. The drums were washed with a caustic cleaning solution which then flowed onto the ground of the 1-acre site. While the company was in operation, as many as 5,000 drums were observed on the site. The soil and groundwater below the site became heavily contaminated. The Medley Wellfield, only 750 feet away, had to be closed.

In a joint action by EPA and Dade County, the Miami Drum site was cleaned up in 1981. All remaining drums were removed along with 9,000 cubic yards of contaminated soil. Contaminated groundwater was pumped and treated to remove contamination. The site is now a switchyard for Dade County's Metro Rail Transit System.

Dade County began operating the N.W. 58th Street Landfill as an open dump in 1952. Waste was placed in open trenches dug below the water table, in the top zone of the aquifer. The 1-square-mile site, located approximately 3 miles east of the Northwest Wellfield, received as much as 3,000 tons of municipal solid waste a day. The landfill ceased operation in 1982, except to receive construction debris. A solid waste resource recovery facility was constructed adjacent to the site in 1982.

Leachate—water seeping through the landfill—has moved into the groundwater, contaminating it with metals and organic compounds. A leachate collection system has been installed. Plans are now being designed to permanently close the landfill. Businesses and residences east of the landfill have been connected to municipal water supplies.
Eliminating Sources of Pollution

Since 1966, approximately 15 spills of hydrocarbons—a term meaning fuel, oil, or industrial solvents—have occurred at Miami International Airport. It is estimated that 2 million gallons of these materials were discharged into the Biscayne Aquifer from 1966 to 1981. At the Eastern Airlines maintenance base in the northeast portion of the airport, 1.5 million gallons of a light petroleum solvent were discovered to have leaked from storage tanks during the late 1960’s.

Because Miami Airport is only 2,000 feet away from the Miami Springs Wellfields, EPA designated the Miami Airport Varsol Spill site as a Superfund site in 1981. Follow-up investigations indicated that much of the spilled solvent could no longer be detected in the groundwater beneath the airport. However, a significant amount of mixed hydrocarbon remained in the aquifer. Because of the wide variety of substances detected, it was impossible to single out any one source of the pollution.

DERM took action in 1983 to capture hydrocarbon contamination under the airport. A series of recovery wells were drilled into the aquifer so that contaminated groundwater could be pumped from under the airport. The water is processed to remove the hydrocarbons and then returned to the aquifer. So far, 320,000 gallons of hydrocarbons have been recovered by this operation. This cleanup, along with controls designed to prevent future spills at the airport, is reducing this potential threat to Dade County’s water supply.

For over 20 years, the Pepper’s Steel and Alloys site in Medley was the location of several businesses. Pepper’s Steel and Alloys was a salvage operation that processed a variety of equipment, including electric transformers. In 1975, DERM discovered the site was a possible source of contamination and began to investigate it. When polychlorinated biphenyls (PCB’s) were discovered in shallow pits dug at the site in 1982, EPA immediately removed 1,200 gallons of PCB-contaminated oil from below the surface. Much of the PCB-laden oil remained and soaked into the soils above the Biscayne Aquifer. The soils slowed the movement of contamination as it seeped toward the aquifer. A cost-effective method was sought to prevent the large amount of contaminated soil from polluting the groundwater.

After studying the site, EPA decided to use a solidification process that trapped contaminated soil in a cement-like material that will keep the PCB’s and the lead and arsenic in the soil from spreading into the Biscayne Aquifer. Work at the site began in April 1987. All contaminated soil was dug up and mixed with fly ash, cement, and inorganic chemicals to form the cement-like material. In addition, a total of 12,000 gallons of contaminated oil was recovered during excavation at the site. This oil was incinerated at an EPA-approved facility. The solid cement-like material was then placed back on the site and covered with crushed limestone to protect it from rainfall and erosion. These activities were completed in January 1989.
While EPA initiated the Biscayne Aquifer Protection Plan, DERM has given special attention to protecting municipal water supplies and has developed a more comprehensive and specific plan for safeguarding Dade County’s Northwest Wellfield. In November 1985, the Dade County Commission adopted 38 recommendations as the Northwest Wellfield Protection Plan. These recommendations involve five different areas which reflect the county’s holistic approach to protecting water supplies:

- **Water Management and Monitoring**  
  *Construct projects to physically manage the groundwater and surface water levels around the Northwest Wellfield; sample and monitor groundwater movement and water quality.*

- **Water Treatment and Waste Management**  
  *Treat water and wastewater; manage, transport, and properly dispose of waste materials that could contaminate the groundwater.*

- **Land Use Policies**  
  *Restrict land use in areas where there is potential to adversely affect the Northwest Wellfield.*

- **Environmental Regulation and Enforcement**  
  *Regulate and control potential activities that could pollute the wellfield; bring legal action against those who pollute.*

- **Public Awareness and Involvement**  
  *Educate the community on the importance of protecting our water supply; involve the public in eliminating sources of contamination.*

DERM, EPA, DER, and the South Florida Water Management District have worked together to take action on nearly all of the 38 recommendations. By protecting the Northwest Wellfield, DERM can ensure that Dade County residents continue to have an ample supply of clean, safe water.

Most of what is spilled onto the ground in Dade County will end up in the Biscayne Aquifer. It is just a matter of time. But the closer the spill is to a water supply well, the more serious the effect can be on polluting that well—and our water supply. A well pumps water from the area surrounding it. This area influenced by the well is often called its “cone of influence.” To illustrate this, place a straw just below the surface of a milk shake and suck very hard. The area surrounding the straw will be pulled down and into the straw. Similarly, water sucked up by a well is drawn from a cone-shaped area with the tip of the cone being at the bottom of the well. Around major wellfields, this cone can extend for miles.

Contamination that gets into groundwater within this cone of influence can be pulled into our water supply. For this reason, the Northwest Wellfield Protection Plan combines water management techniques, environmental regulations, and controls on land use within the wellfield’s cone of influence. These land use controls have now been incorporated into the Dade County Master Plan, which guides the activities that can occur in the county.

Commercial and industrial land uses in the Wellfield Protection Area are restricted to those that pose a minimal threat of contaminating the aquifer. Virtually any business that uses or creates a hazardous substance is prohibited from locating within the Wellfield Protection Area. The density of residences allowed in the Wellfield Protection Area has been reduced to 1 unit per 5 acres of land. By reducing
the number of people living within the wellfield’s cone of influence, less contamination is likely to enter the groundwater. Limestone quarrying, with certain restrictions, is permitted in areas between the wellfield and the canals that serve to recharge the aquifer. Removing limestone allows more clean water to be stored in the areas near the wells. However, quarrying operations must be secured to prevent illegal dumping.

These land use controls work hand-in-hand with environmental regulations, thus preventing activities that could pollute Dade County’s drinking water. Where contamination has already occurred, water management techniques are used to prevent the wellfield from drawing water from contaminated areas. ☐

Land use is restricted within the Northwest Wellfield Protection Area. Only those activities that do not threaten the wellfield with contamination are allowed. The wellfield protection area extends to the east temporarily, as illustrated by the dotted line.
Although many actions have been taken to protect the Biscayne Aquifer, much remains to be done. Several of the recommendations in the 20-point Biscayne Aquifer Protection Plan and the 38-point Northwest Wellfield Protection Plan have not been fully implemented because of a variety of issues.

One issue that has not yet been resolved is how to finance construction and maintenance of a facility for the collection of hazardous waste materials. Individually, small businesses and households do not generate much waste. But together, a significant amount of potentially harmful materials could be disposed of in ways that contaminate our water. Because of the acute need to control the widespread disposal of small amounts of waste, five sites for a collection facility have been selected in conveniently located areas where businesses and individuals could come to dispose of their hazardous waste. Douglas Yoder, Assistant Director of DERM, states, “Any system we devise to control hazardous waste disposal must be both environmentally sound and economically feasible.”

Methods to finance a collection facility are being explored to provide disposal services at a reasonable cost to businesses and individuals. Part of the problem has also been finding the right location for such a facility. Discussions with other counties to explore the possibility of creating a regional facility continue. But then, nobody wants a hazardous waste facility in “their own backyard.” However, it is in everyone’s interest to protect the Biscayne Aquifer, and developing such a facility is an important step in doing so.

Additional concern exists over the proper disposal of used motor oil by residents and businesses. When poured on the ground or into a storm sewer, used oil can easily contaminate surface and groundwater. Initial efforts in 1984 to create local collection stations for the proper disposal of motor oil were successful. A total of 150 gas stations and auto repair shops were willing to accept waste oil without charge—or even pay for it. However, the declining price of oil has reduced the number of these locations to 18. Four neighborhood trash transfer stations have been set up by the county to collect waste oil. The state will fund additional sites. For other household and small business waste, the state sponsors periodic “amnesty days” when small amounts of hazardous waste can be brought to several locations free of charge. In this way, hazardous waste is collected and disposed of properly.

Dade County residents now depend on the Northwest Wellfield for over 40 percent of their water. In order to meet future water demands caused by rapid growth in the county, government officials are considering developing a new “West Wellfield,” located 16 miles southwest of downtown Miami. This area is undeveloped, zoned for residential and agricultural uses, and located near vast areas of wetlands. Land use would need to be restricted in this area which is now being consid-
ered for future development. To provide for growth, would Dade County be in fact restricting growth in some prime development land? What needs to be done about the loss of wetlands from wellfield drawdown? This area is now open land and has agricultural activity. Is agriculture appropriate in wellfield protection areas?

The use of pesticides, fertilizers, and equipment in farming has long been known to pose a potential risk of contaminating groundwater. With groundwater moving rapidly through the porous Biscayne Aquifer and with the county now considering placing a municipal wellfield in a largely agricultural area, DERM has been working with the farming community to determine what can be done to protect groundwater from contamination.

As a result, an annual permit program has been established to inspect potential sources of pollution in farming: packinghouses, cropduster loading operations, pesticide mixing facilities, and agricultural maintenance and storage facilities. Communication has been the cornerstone of the permitting program. Farm organizations have assisted DERM in developing effective yet economical management practices to prevent pollution. DERM has worked with the County Agricultural Extension Office to conduct a series of workshops explaining the program to the community. Having surveyed patterns of local pesticide usage, DERM is now planning to monitor the effect of pesticide application on groundwater quality.

Clearly, more needs to be done. As government officials continue to develop plans to protect our water supply, the help and cooperation of the entire community is needed. This is an issue that affects every one of us.

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**Enforcing Regulations That Protect Our Water**

Over the last 5 years, DERM has created permit programs to control the way hazardous materials and waste are handled by industrial operations in Dade County. Sixty inspectors and other field personnel now review permit applications, inspect facilities to observe operational practices, and check out businesses that may be operating illegally without a permit. The permitting programs also advise industries on "best management practices," recommending actions business can use to most effectively protect against accidental spills and leaks that could pollute our drinking water. Inspectors can provide guidelines to businesses on cost-effective measures to protect the aquifer.

To support DERM's efforts in identifying sources of pollution of the Biscayne Aquifer, a sophisticated laboratory has been set up to test samples of water, soil, and air. First established in 1968, the laboratory now employs 18 chemists and lab technicians who run more than 25,000 samples per year. "In laboratory testing, you get the best results when you do it yourself," said Carl Pfaffengerber, manager of DERM's Environmental Monitoring Division. "Because we are running so many samples through the lab, using an outside service would be more expensive."

Reliability, combined with the need to coordinate sampling and testing with enforcement inspectors, is another reason DERM established an extensive laboratory program. Says Pfaffengerber, "We're looking for reliable test results that we can use in court if we have to."

The lab is fully computerized, logging and tracking all samples taken for testing. With the lab equipped to run 33 types of analysis, it is able to run tests for all inorganic and volatile organic chemicals of concern, as well as a variety of pesticides commonly used in Southeast Florida. DERM is expanding the lab's capabilities to test for 83 compounds stipulated in the new federal drinking water standards.

Those businesses found to be violating environmental regulations can be issued tickets by DERM inspectors. An administrative hearing process has been set up within DERM to enable violators an opportunity to work more closely with the county in complying with regulations. To identify those who are frequently endangering the Biscayne Aquifer with illegal dumping activities, DERM has set up the Environmental Strike Force. The Strike Force identifies and obtains evidence to prosecute illegal dumpers.
EPA conducted studies of the Biscayne Aquifer from 1981 to 1985. Results of testing showed groundwater contamination in most of the study area. Most of the contaminants found were volatile organic compounds (VOC’s)—man-made chemicals that can dissolve in water or evaporate into the air. VOC’s are contained in industrial solvents and cleaners, and in household substances such as paint thinners, cleaning fluids, gasoline, and even felt-tip pens.

EPA determined from its study and a series of pilot tests that water from the Miami Springs, Hialeah, and Preston Water Treatment Plant Wellfields could be treated using a system known as air stripping. Contaminated water flows down through a tower filled with clean packing material. Air is blown up through the tower as the water cascades down, causing the VOC’s in the water to evaporate into the air—essentially “stripping” the VOC’s from the water. Virtually all of the VOC’s are removed in this process, producing clean water that may be used or returned to the Biscayne Aquifer. Although the VOC’s are released into the air, the effect on air quality is considered minor and is within air quality standards.

A total of 64 air stripping towers will be constructed during the next 2 years. Twenty will be placed at the Hialeah Water Treatment Plant. Forty-four will be placed at the Preston Water Treatment Plant. Once activated, this treatment process has the capability to clean the contaminated portion of the aquifer and provide high-quality water that meets or surpasses federal and state drinking water standards.

The federal government is paying 41 percent of the nearly $40 million in construction costs of these air strippers. Dade County and the federal government are working cooperatively to construct the towers.

Twenty air stripping towers like the one at the Preston Water Treatment Plant will be built at the Hialeah Water Treatment Plant to remove volatile organic compounds from the water.
In this report, you have read that the Biscayne Aquifer is an irreplaceable source of drinking water. Lying just beneath the surface of Southeast Florida, the aquifer is easily contaminated. But EPA, DERM, DER, and the South Florida Water Management District have teamed up to protect our sole source of water. Together we are cleaning up today’s sources of pollution, and taking steps to avoid similar pollution in the future.

Protecting the Biscayne Aquifer is a partnership not only among government agencies, but also among citizens, businesses, industries, community leaders, and government officials. We all depend on the same source of water. We can’t live, grow, or prosper without it. This dependence affords our community a unique opportunity to work together, protecting a vital resource upon which we all depend. DERM and EPA strive to work in cooperation with Dade County businesses, industries, and citizens.

All of us play an important part in protecting our water. What can the private citizen do?

- Use pesticides and fertilizer with discretion; buy only quantities needed and follow application instructions.
- Take your used motor oil to a collection center.
- Dispose of household chemicals in an environmentally sound manner; take materials to collection centers on “amnesty days.”
- Recycle.

For environmental information and to report pollution problems, call the DERM hotline.

DERM HOTLINE
375-DERM (375-3376)

It's Up to You!
About This Issue

This report is the third in a series that explains what is being done to protect the Biscayne Aquifer. Copies of the first two reports, Recommendations to Clean Up and Protect the Biscayne Aquifer in Southeast Florida and Protecting the Biscayne Aquifer—Actions To Be Taken at the Pepper’s Steel and Alloys Site, can be obtained by contacting the U.S. Environmental Protection Agency (EPA). Additional copies of this report are available from:

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