TENNESSEE VALLEY AUTHORITY 2002-2003 ENVIRONMENTAL REPORT

TVA

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www.tva.com

MANAGEMENT COMMITMENT

The members of TVA's Board of Directors answer questions about TVA's environmental protection initiatives.

How can TVA help meet the Tennessee Valley's growing energy and economic development needs while still protecting the natural resources that draw industries, residents, and visitors to our region?

Chairman Glenn L. McCullough, Jr.: More than ever, we are intent on setting and reaching goals that enable TVA

to achieve excellence in both business performance and public service. As TVA prepares to face the business challenges of a changing electric-utility industry, we never forget what TVA means to the 8.5 million people of the Tennessee Valley. TVA means that the lights stay on and the bill is affordable. TVA means the river is healthier and provides flood control, navigation, recreation, and affordable power to the public. TVA means the air is cleaner for everyone to breathe as a result of the emissions-control equipment TVA is adding at our 11 fossil plants. And TVA means the creation and retention of more and better jobs, empowering families to work hard and build better lives. By balancing competing demands on TVA's integrated river and power system, TVA protects the environment while managing the river to provide multiple benefits. And by using the latest renewable technologies to expand our Green Power Switch® program and other renewable technology programs, TVA continually works to find new, cleaner ways to meet the region's needs for sufficient, reliable, affordable electricity. In addition, TVA is continually strengthening partnerships to encourage energy conservation and is investing wisely and effectively in new generating capacity, transmission system improvements, and clean-air equipment. This environmental report gives stakeholders an update both on TVA's important environmental stewardship advances and its ongoing challenges, while also discussing how TVA is developing solutions that will help preserve our region's natural resources and quality of life for generations to come.

In 2001, TVA reported that it would implement an enhanced Environmental Management System (EMS), its results-oriented method of managing environmental performance, by May 2002. Was that goal met, and what progress has been made?

Director Skila Harris: Yes, I'm pleased to report that TVA achieved its 2002 goal for full implementation of the updated EMS. The EMS is a tool to ensure that each employee understands TVA's responsibilities and legal requirements when it comes to environmental stewardship. More important, however, the EMS is a way to factor that understanding into everything we do. Through standardization and continuous improvement, it maximizes efficiency and effectiveness, enabling TVA to focus on achieving the greatest environmental benefit for each dollar invested. The EMS also provides measurable environmental performance information that allows us to better manage risk, thus improving TVA's financial performance.

We had expected to see multiple benefits from implementation of the EMS, including increased conservation of materials and energy, better environmental protection management, and an overall competitive advantage for TVA. So far, the results have exceeded

our expectations. Since implementation of the new system, TVA has saved in excess of $20 million cumulatively and has reduced internal audit findings by 67 percent. TVA is the first federal agency to fully implement its EMS at all facilities.

MANAGEMENT COMMITMENT

How will restarting Browns Ferry Nuclear Plant Unit 1 affect the environment?

Director Bill Baxter: TVA must continue to secure new energy resources to keep pace with our region's growing economy, which brings jobs to the people of the Tennessee Valley. Nuclear power generation provides clean, affordable, and reliable power. In fact, it is an emission-free technology compared to fossil-fuel combustion. According to the Nuclear Energy Institute, nuclear generation worldwide kept 67.3 million metric tons (74.5 million tons) of sulfur dioxide (SO_2) and 34.2 million metric tons (37.7 million tons) of nitrogen oxides (NO_x) out of the air between 1973 and 2002.

So for TVA, restarting Browns Ferry Nuclear (BFN) Unit 1 in Decatur, Alabama, was a solid business decision in terms of power supply, cost, generation mix, delivered cost of power, and the environment. This $1.8 billion investment is scheduled to add 1,280 megawatts of generating capacity to the TVA system by 2007. BFN Unit 1, projected to be the nation's first nuclear unit brought online in the 21st century, is expected to pay for itself through power revenues by 2015. Bringing this additional nuclear-generated power back into the mix is consistent with TVA's commitment to pursue opportunities to reduce, avoid, or sequester its greenhouse gas emissions.

How well did TVA meet its environmental objectives and targets for 2002-2003?

Chairman McCullough: During 2000, TVA developed 15 specific operational targets through the EMS that had the greatest potential for improving our environmental protection efforts or were required by state or federal regulations. These targets included reductions in both solid and radioactive waste production and decreases in emissions to the air. All 15 targets are incorporated into TVA's performance plans, and progress is monitored on an ongoing basis. The results for 2002 and 2003 were mixed. For example, TVA's production of low-level radioactive waste and hazardous waste increased from 2001 levels. However, TVA continued to develop innovative ways to recycle other wastes into usable products, preventing additional pollutants from entering the air, water, and land.

From 2002 to 2003, the utilization of coal-combustion products increased from 48 to 55 percent. Coal-combustion products, which can strengthen construction materials, provide plant nutrients, and enhance depleted soils in various agricultural applications, represent a vastly underused resource.

Director Baxter: Although TVA missed both its SO_2 and NO_x targets in 2003, it continues to make great strides in its efforts to improve air quality in the Valley. Having already invested $4 billion through 2003 in clean-air equipment, TVA plans to spend on the order of $2 billion on the installation of additional selective catalytic reduction (SCR) systems and new flue-gas desulfurization systems, or scrubbers, which help reduce SO_2 emissions from coal-fired plants.

When all the scrubbers are in place, TVA will be on target to achieve an 85 percent reduction in SO_2 emissions from 1977 levels. The 6.1 percent power rate adjustment effective in fiscal year 2004, only the second rate increase in 16 years, enables TVA to invest some $2.5 billion—about a million dollars a day through the end of this decade—in scrubbers to extract SO_2 and SCRs to reduce NO_x emissions.

As part of its $1.3 billion NO_x reduction program, TVA completed four more SCR installations—one each at Cumberland, Widows Creek, Allen, and Paradise fossil plants—bringing the total number of operational SCRs to eight. The remaining installations will be completed by 2005. This intensive pollution-control program, one of the largest in the nation, will help TVA meet its goal of reducing NO_x emissions at its plants by 70 to 75 percent during the summer ozone season. Included in the NO_x reduction program is a new clean




MANAGEMENT COMMITMENT

air technology, NO_xStar, which TVA continued to develop during 2003. Although NO_xStar does not reduce NO_x emissions quite as effectively as an SCR, its lower capital cost and ease of installation could enable TVA to add control systems to more units.

Director Harris: In terms of reducing greenhouse gas emissions, TVA's renewable energy program, Green Power Switch (GPS), continued to add both distributors and customers in 2002–2003. Launched in 2000 with 12 distributors, it now has 65. In 2002 the program earned two top-10 national rankings, for energy production and customer participation.

GPS was the first renewable energy program in the region that offered power from wind, solar, and methane gas technologies. These resources can be used with a greatly reduced impact on the climate compared with fossil fuels. Having an adequate supply of renewable generation continues to be a challenge, however. Without additional supply, GPS will not be able to expand into more distributor territories. One innovative solution we're exploring involves acquiring solar and wind generation from residential and small commercial customers through the GPS Generation Partners program. These suppliers receive credits on their energy bills for all the power they generate from these renewable sources.

Does the public have any say in the way TVA carries out its environmental strategies?

Chairman McCullough: An essential part of TVA's relationship with Valley citizens is gathering input from those who live, work, and play here. Responding to the diverse values and priorities of all of our stakeholders is an ongoing challenge. TVA's Reservoir Operations Study is a good example of how TVA has asked the people of the Valley to help us determine if changes in our reservoir system operating policies would produce greater overall public value.

As part of this comprehensive study, TVA received input from the general public, from an Interagency Team composed of representatives from 10 federal agencies and six Valley states, and from a 13-member Public Review Group, which includes representatives from various businesses, municipal utilities, and stakeholder groups. TVA also conducted a number of community workshops at various locations across the Tennessee Valley. This feedback was used to define the scope of the study, identify public values, and develop and evaluate alternatives.

The recommendation to initiate this comprehensive study came from the Regional Resource Stewardship Council (RRSC), which was created in 2000 to advise TVA on the management of natural resources in the Tennessee Valley. The purpose of this 20-member council is to gather advice on natural resource management from the public and private sectors so that TVA can be responsive to the needs of people across the region. The first-term council made a number of recommendations to the TVA Board during its two-year tenure. The second-term RRSC was convened in October 2002 with both new and returning members. Key issues addressed by the council include water supply, recreation, and management of public lands.

TVA is committed to improving the quality of life in the region through responsible environmental stewardship and balanced, integrated management of the Tennessee River system. Listening and responding to stakeholders helps us fulfill our mission: to keep the lights on, to reduce the impact of floods, to provide water for recreation and navigation, and to enable our region to compete for the manufacturing and high-tech jobs that continue to bring new people and new opportunities to the Valley. It is a mission that is more relevant and valuable than ever to the people in the Tennessee Valley.

STAY CONNECTED

To read the environmental policy and principles that help guide TVA's work, go to www.tva.com/environment.

ENVIRONMENTAL PROTECTION AND STEWARDSHIP

Through its management of the Tennessee River system, TVA works to balance the benefits of navigation, flood control, power production, water supply, water quality, recreation, and land use. But to the Valley's diverse collection of wildlife—about 200 species of fish, 100 species of freshwater mussels, 60 species of mammals, 200 species of breeding birds, 140 species of reptiles, and 60 species of amphibians—it's water quality that matters most.

As a responsible steward of the Tennessee River Valley's 108,800-square-kilometer (42,000-square-mile) watershed, TVA helps keep the region's water clean and life-sustaining. It accomplishes this important objective through its policies and practices, and especially through the partnerships it builds with community groups and other stakeholders. So when Congress and the President challenged all Americans to mark the 30th anniversary of the Clean Water Act by setting a good example of environmental stewardship, TVA and its multidisciplinary Watershed Teams were already well along in meeting this standard.

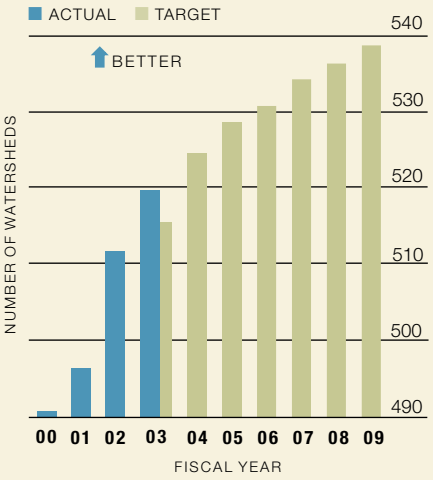
Throughout the Tennessee Valley, TVA's Watershed Teams work in partnership at the grass-roots level to protect and improve water quality by providing technical expertise to help reduce or eliminate nonpoint sources of pollution, such as runoff from farms, new construction, and storm-water drains.

In 2002 and 2003 the teams maintained involvement in approximately 50 water quality improvement initiatives across the Valley that identified water quality issues, developed local partnerships to address these problems, and jointly implemented action plans.

Watershed Teams also partner with dozens of volunteer organizations and resource agencies to conduct trash cleanups along reservoir shorelines and stream banks. During the past two years, these collaborative efforts helped to organize 144 events involving 15,314 volunteers, who collected 1,201 metric tons (1,324 tons) of litter along the Valley's waterways.

Since preventing all forms of pollution from entering the reservoir system is the best way to keep the water clean, TVA's Watershed Teams work with other federal, state, and local agencies to heighten public awareness of the harm caused by the introduction of garbage, untreated sewage, petroleum, and other pollutants into the Valley's waterways. Events held in conjunction with the TVA-led Tennessee Valley Clean Marina Initiative and the National Clean Boating Campaign have been particularly successful at reaching marina owners and recreational boaters. The Clean Marina Initiative, a voluntary regional program developed by TVA and its watershed partners, promotes environmentally responsible marina and boating practices that focus on sewage and fuel management; solid waste and petroleum recycling and disposal; vessel operation, maintenance, and repair; marina siting, design, and maintenance; storm-water management and erosion control; and boater education.

WATERSHED CONDITIONS RATED FAIR OR GOOD



By the end of 2003, 25 marinas in the seven-state TVA region had qualified to fly Clean Marina flags as a result of their efforts to minimize boating-related pollution. Another 22 or more Valley marinas are expected to receive the certification in 2004. TVA Watershed Teams provide support and educational resources to assist marina operators working toward certification. For more information about the Clean Marina Initiative, go to www.tva.com/environment/water, or contact your local TVA Watershed Team office via www.tva.com/river/landandshore.




ENVIRONMENTAL PROTECTION AND STEWARDSHIP

For TVA, responsible river stewardship extends beyond the water to the shoreline, where erosion can adversely affect water quality and threaten wildlife and fisheries habitat. Since landscaping with native plants is one of the best ways to stabilize shorelines and keep harmful pollutants from reaching the reservoir, TVA Watershed Teams assist property owners who want to create an environmentally friendly waterfront featuring indigenous grasses, shrubs, and trees.

To facilitate this effort, in 2003 TVA developed 11 fact sheets on the restoration of riparian zones—the biologically distinctive areas at the water's edge. Each fact sheet covers a separate topic, such as the benefits of using native vegetation; designing a shoreline landscape; understanding and controlling erosion; and selecting, planting, and maintaining native plants. The information is specifically tailored to the Valley and includes photographs and illustrations of sample landscape plans. The riparian restoration fact sheets are available at local TVA Watershed Team offices, or they can be downloaded at www.tva.com/river/landandshore/stabilization.

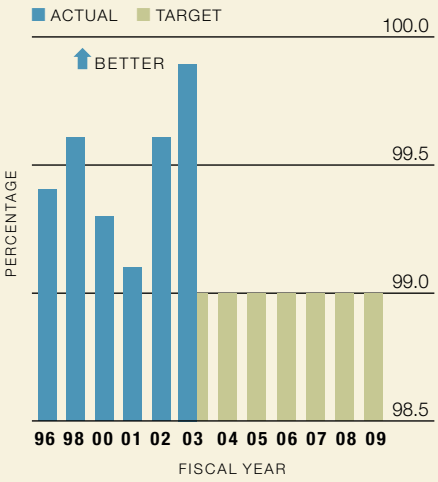
A resource to help residents select shoreline plants is TVA's new Native Plant Selector, an online guide located at www.tva.com/nativeplants. Using the guide, property owners can compare various regional native plant species and find out which ones address specific stream-bank or shoreline conditions. Included in the database are photographs of the plants and details on their height and light requirements, bloom time, moisture and soil needs, wildlife value, and other characteristics.

Stakeholders have consistently rated shoreline conditions, especially erosion problems, as a priority area needing improvement. Informing property owners about the benefits of native landscaping is only one way TVA has been working to stabilize shorelines throughout the river system.

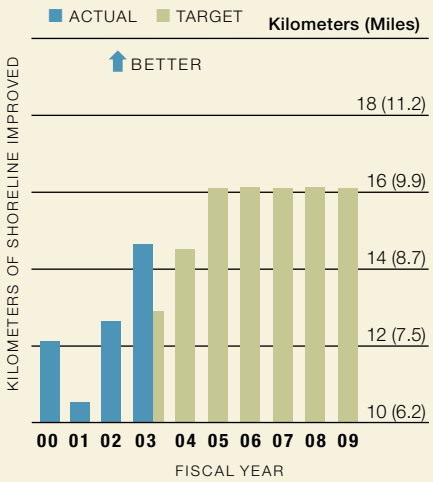
Critically impaired shoreline is defined as shoreline areas where erosion threatens the stability and integrity of significant archaeological sites, degrades wildlife and fisheries habitat, contributes to reservoir sedimentation, or adversely affects water quality and shoreline aesthetics. TVA carries out stabilization and revegetation treatments to restore and enhance the degraded shoreline. In 2002–2003, 26.7 kilometers (16.6 miles) of critically impaired shoreline was stabilized, preventing 24,500 metric tons (27,000 tons) of soil from eroding and entering the reservoir system. This includes 33 eroding archaeological sites, which were identified and stabilized along 6,187 meters (20,300 feet) of shoreline on the main stem of the Tennessee River.

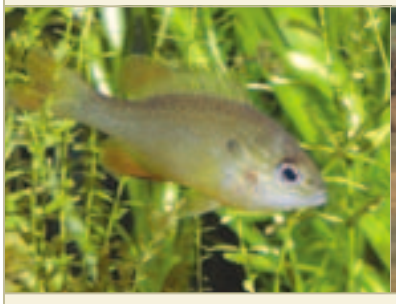
For example, the Upper Holston Watershed Team worked with several stakeholders to stabilize six critically eroding shoreline sites on South Holston, Boone, and Fort Patrick Henry reservoirs in Virginia and Tennessee. The cooperative work involved stabilizing about 1,219 meters (4,000 feet) of shoreline banks by establishing gentle slopes, laying down and securing a filter fabric that allows water movement without soil

MINIMUM-FLOW ACHIEVEMENT
As Defined by Reservoir Improvement Plan



CRITICALLY IMPAIRED SHORELINE IMPROVED





ENVIRONMENTAL PROTECTION AND STEWARDSHIP

loss, installing rock riprap, and planting native trees and shrubs. Partners in this effort included the Washington County (Virginia) Park Authority and Sheriff's Office, the Sullivan County (Tennessee) Highway Department and Parks Commission, the Tennessee Department of Environment and Conservation, the Tennessee Department of Corrections, and TVA.

A true test of whether environmental efforts are working is the life-sustaining capacity of reservoir water. Maintaining minimum flows and adequate dissolved oxygen levels in the water are key elements that affect aquatic life. Over the years, TVA has been successful in using these methods to increase the diversity of aquatic species throughout the reservoir system. However, in 2003, a problem with the aeration system configuration at Nottely Dam, near Blairsville, Georgia, resulted in decreased dissolved oxygen levels in the tailwater (the water below the dam) during most of August and September, and as a result TVA failed to meet its dissolved oxygen target.

On a positive note, though, radio tracking and monitoring indicates that three years after the reintroduction of lake sturgeon into the French Broad River below Douglas Dam, the fish are thriving. Sampling shows that the sturgeon have doubled in size and appear to be in excellent condition. They are spreading throughout the upper Tennessee River system, with recaptures reported from the Holston and Little Pigeon rivers as well as the French Broad, and from Fort Loudoun, Watts Bar, Melton Hill, and Chickamauga reservoirs.

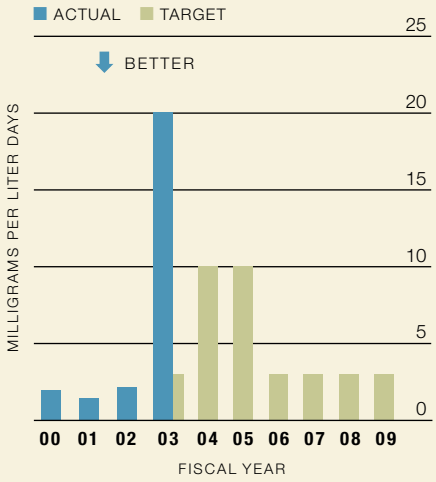
TVA's commitment to environmental protection extends to one of the Valley's most valuable natural resources, public land. In 2002, TVA achieved significant progress in two areas of land planning that will help spur environmentally sensitive economic development while also preserving green spaces.

First, the Pickwick Reservoir Land Management Plan, which covers portions of Alabama, Tennessee, and Mississippi, was finalized after more than 18 months of collaborative effort. TVA invited the general public, state and federal officials, and various special interest groups to participate in the land planning process. By combining this public input with resource data and their own professional knowledge about the reservoir, TVA specialists established allocations for various parcels of TVA-managed reservoir lands. These allocations are the foundation of a land management plan that will support TVA goals, balance competing demands, respond to the needs of stakeholders, and meet TVA's responsibility to protect natural resources.

Second, since TVA has a total of 27,400 kilometers (17,000 miles) of transmission lines stretching across rural and urban landscapes throughout the Valley, the effective management of transmission line rights-of-way

DISSOLVED OXYGEN DAYS NOT MEETING TARGET

Due to Forced Outage



2003 reflects lower tailwater dissolved oxygen at Nottely.

FY 04 and 05 targets reflect potential impacts from the Reservoir Operations Study.

"TVA has demonstrated its commitment to environmental stewardship through its work in preserving, restoring, and enhancing wildlife habitats throughout the Valley. By assuming a leadership role in protecting these valuable natural resources, TVA is helping ensure that humans can live sustainably in a biologically diverse world."

Bill Howard, Wildlife Habitat Council President




ENVIRONMENTAL PROTECTION AND STEWARDSHIP

GUEST RIVER RESTORATION

The Guest River is located in the southwest Virginia section of the watershed overseen by TVA's Clinch-Powell Watershed Team. Sedimentation from past coal mining activities and bacterial contamination from inadequate wastewater treatment were two long-standing problems affecting water quality in this tributary of the Clinch River. An extensive TVA monitoring program showed that drainage from abandoned mine lands has caused excessive erosion and decreased the vegetative cover that forms part of the watershed's natural riparian habitat. Untreated wastewater discharge, previous mining operations, and urban runoff also contributed to the low level of water quality and high bacteria levels in the Guest River.

The Virginia Department of Environmental Quality placed the Guest River watershed on Virginia's "impaired waters" list, but the river's name might not be there much longer. Thanks to the environmental improvement efforts of the Guest River Group, the river is making a remarkable comeback in water quality, and recommendations have been made to upgrade the status of the river.

The key to the Guest River restoration was unifying local, state, and federal partners in a single environmental effort. Since 1998, TVA's Clinch-Powell Watershed Team has helped the Guest River Group restore 9.7 kilometers (six miles) of stream bank, reclaim 10 abandoned mine sites, and clean up 40 of 56 illegal trash dumps. In four waste collection events sponsored by the group, almost six metric tons (13,000 pounds) of debris was removed.

The ongoing restoration of the Guest River has earned an impressive array of state and national accolades, including both the Keep America Beautiful first place national award and the Keep Virginia Beautiful state award for three years in a row (2000–2002).

(ROWs) and easements is another land management priority. To enhance wildlife habitat and minimize maintenance, TVA partners with private landowners, conservation organizations, and hunting clubs in planting low-growing native vegetation along ROWs in environmentally sensitive areas.

Examples of these partnerships include:

- A program that reimburses property owners up to a total of $150 for converting brush acres to native grass.
- The Alabama Wild Power Project, which makes property owners who have transmission lines crossing their land eligible to receive funds for brush removal and plantings in the ROW that attract, shelter, and feed wildlife.
- The ROW Landowner Partnership Project with the Tennessee Wildlife Resources Agency. This project involves eliminating invasive exotic plants and reestablishing native grasses and other vegetation on lands at Oak Ridge National Laboratory, a Department of Energy site in Tennessee. The benefits include reducing the cost of vegetation control, creating a healthier wildlife habitat, making the area look more appealing, and reducing the frequency of TVA vegetation control visits.

In addition to tracking the ROW acres managed through partnership efforts, TVA continues to pursue opportunities to better inform the public about partnership opportunities, including development of a Web site to address issues of concern to property owners. The site will include TVA's vegetation maintenance schedule, frequently asked questions regarding acceptable practices in ROW areas, and local TVA contacts with whom property owners can discuss individual concerns to more effectively manage ROW acreage.

The height of vegetation is of particular concern in ROWs because when power lines are overloaded they begin to sag. If the vegetation makes contact with the lines, it can cause them to short out, a factor that contributed to the Northeast blackout in 2003. To help increase awareness of this concern among ROW property owners, TVA developed two brochures identifying trees, shrubs, and grasses that are ideally suited to ROW landscaping. The brochures can be downloaded at www.tva.com/envreport.

STAY CONNECTED

At www.tva.com/envreport

- **National Public Lands Day** encourages Americans to "Lend a Hand to America's Lands." Read how TVA Watershed Team members and local volunteers collaborated to provide the helping hands needed to remove tons of trash from public lands.
- Tennessee teacher **Mimi Hughes** completed her swim along the 1,049-kilometer (652-mile) Tennessee River in July 2003. Find out how her aquatic odyssey helped promote public awareness of the need to protect the river.
- TVA won **environmental protection and stewardship awards** from various state and national organizations in 2002 and 2003. Learn about TVA's award-winning people and programs.

POLLUTION PREVENTION

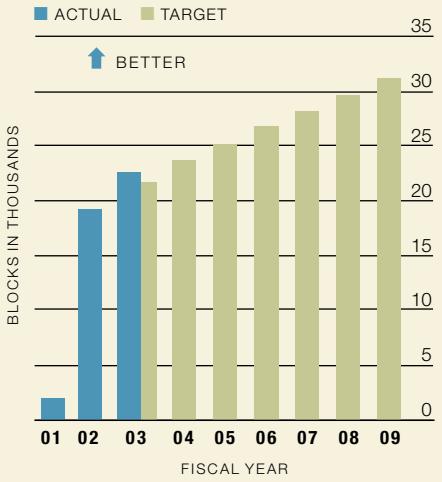
Much of the energy that powers economic development, a high quality of life, and a low cost of living in the Tennessee Valley is derived from the earth's natural resources. The use of fossil fuel energy sources like coal, however, can have detrimental environmental impacts.

To offer customers the option of purchasing electricity from more environmentally friendly "green power" energy sources—wind, solar power, and methane gas, for example—TVA launched Green Power Switch® in 2000. Although no source of energy is impact-free, renewable resources create less waste and pollution.

Due to the tremendous public response to the program, GPS added 53 additional power distributors during 2002–2003. In addition, the GPS solar sites were expanded from 12 to 15, with new sites opening at the City of Florence Water Treatment Facility in Florence, Alabama; the University of Mississippi Intramural Sports Complex; and Mississippi State University's Landscape Architecture Building.

Obtaining qualified generation resources to meet customer demands for green power cost-effectively is an ongoing challenge. For example, Middle Point Landfill, projected to become an important methane gas generator for the GPS program, did not fulfill capacity expectations and experienced production setbacks. As a result of these delays, this landfill was removed from the GPS program.

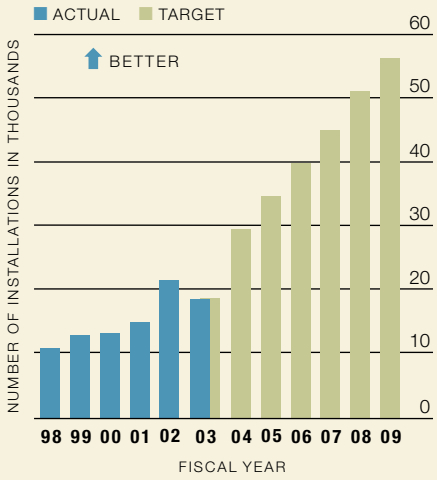
GREEN POWER SWITCH® BLOCKS SOLD



energy right®

There's no place like home, especially when that home helps prevent pollution and protect the environment. TVA's *energy right* program promotes the installation of energy-saving heat pumps in existing homes and manufactured homes and the construction of energy-conserving new homes. A first step toward energy conservation is participating in the *energy right* program, but participants are encouraged to reach for the gold standard in energy efficiency – the federal government's Energy Star® designation. Homes that earn both *energy right* and Energy Star labels are recognized as the most energy-efficient in the nation. Twenty-five percent of heat pumps installed through *energy right* meet the requirements of Energy Star®. Fifteen percent of new homes constructed in the program are rated as 30 percent more efficient than the minimum standards required by the Department of Energy. In addition, these homes meet the minimum efficiency rating required by the Energy Star program. In Nashville's Sam Levy Homes public housing neighborhood, 250 new single-family, energy-efficient homes were built to *energy right* standards.

NUMBER OF ENERGY-EFFICIENT NEW-HOME INSTALLATIONS THROUGH *energy right®* PROGRAM



"Our partnership in TVA's Green Power Switch established Lowe's as the top corporate purchaser of green power in the southeastern United States. We are proud to be a leader in the use of renewable resources and commend TVA for its commitment to make green power readily available to both corporate and residential customers."

Robin Nickles, Vice President, Retail Facilities Management, Lowe's Home Improvement Warehouse

POLLUTION PREVENTION

HOW CLEAN IS THE AIR?

How clean is the air in the southeastern U.S.? The answer is found in the aptly named "How Clean Is the Air?"—a report on air quality in the east-central United States produced by TVA in 1979, 1984, 1990, and 2003.

The most recent "How Clean Is the Air?" reported that while air quality in the Southeast today is substantially better than it was in 1979, there is still room for improvement.

The 2002 data indicate that the levels of suspended particulates—dust and other minute airborne solids, sulfur dioxide, and carbon monoxide—have dropped dramatically. Those levels are currently 40 to 60 percent lower than in 1979, and all areas in the Valley meet clean air standards for these pollutants. Acidic deposition—acid rain, snow, and particles—has also improved due to a national decrease in SO_2 and NO_x emissions. However, there is still concern over acidic deposition in the most sensitive, high-elevation forests and streams.

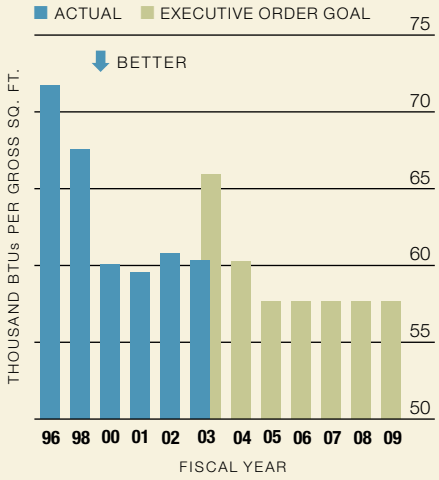
While the overall air-quality trend is positive, the results for ozone levels are mixed. There has been improvement in one-hour average ozone levels of 6 to 9 percent, yet only a minimal improvement—3 to 6 percent—has been observed when ozone levels are averaged over an eight-hour period.

Because weather plays such a large role in ozone formation, there are some years where levels during ozone season—May to September—are better than others. The new eight-hour standard will soon be used to determine clean air status. Once this standard is implemented, several areas are expected to exceed it.

Learn more about air quality trends and read "How Clean Is The Air?" at www.tva.com/environment/air.

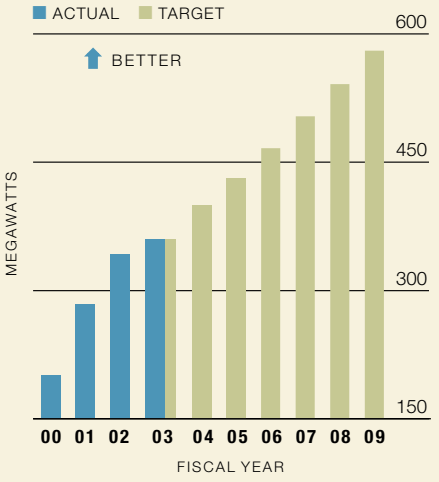
The co-firing of methane gas from the Memphis wastewater treatment facility with coal at TVA's Allen Fossil Plant is a welcome addition to the GPS supply mix. Thanks to the co-firing at Allen, the plant can reduce the amount of coal it burns by more than 7,257 metric tons (8,000 tons) each year.

TVA BUILDINGS' ENERGY CONSUMPTION



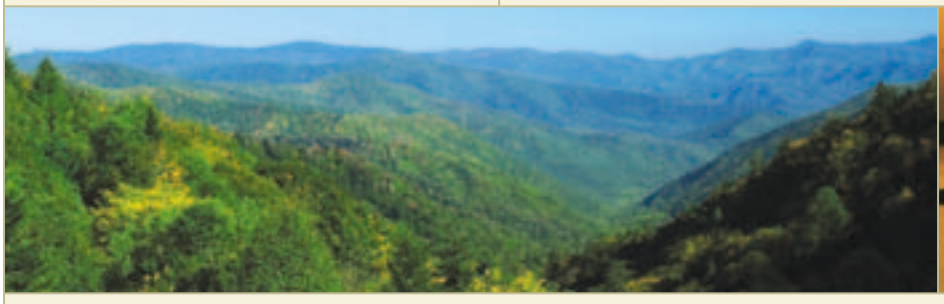
FY 04 figure is a TVA designated target.

REDUCTION OF PEAK ENERGY DEMAND



Finding suitable, available sites to generate cost-effective wind power has also proved challenging for TVA. An additional 27 megawatts of wind power was targeted for construction at the Buffalo Mountain site near Oak Ridge, Tennessee, the only commercial wind energy site in the Southeast. However, a series of contractual and land easement issues arose, which contributed to project delays. TVA continues to evaluate its plans for additional wind turbines to ensure that cost-effective wind generation will remain available to participants in the GPS program. This will also make it possible for TVA to offer GPS to additional distributors Valley-wide.

A 2002 partnership between GPS and Lowe's Home Improvement Warehouse, the world's second-largest home improvement retailer, is helping promote awareness of the program in both the residential and commercial sectors. Lowe's buys enough green power to equal 5 percent of its total electric usage in the Tennessee Valley. By signing on with Green Power Switch, Lowe's also became the first home improvement retailer to join the Green Power Partnership, a voluntary Environmental Protection Agency (EPA) program aimed at reducing the environmental impact of electricity generation.



POLLUTION PREVENTION

While developing cleaner power helps prevent pollution by addressing the supply side, demand-side management reduces pollution by finding ways to use energy more efficiently, meaning less power has to be generated. Working with distributors of TVA power, TVA promotes the most efficient use of construction resources, energy efficiency, water conservation, and pollution prevention in new and remodeled homes and commercial buildings. These sustainable building concepts are being incorporated at several sites throughout the Valley, including Uptown Memphis, the redevelopment of a 100-block area around St. Jude Hospital in Memphis. Schools are becoming more energy-efficient as well, thanks to a TVA-developed network of consultants, designers, and installers who implement energy-saving projects and conduct energy audits.

STAY CONNECTED

At www.tva.com/envreport

- Read about the latest national award for TVA's renewable energy program, Green Power Switch.
- GPS received a pair of top-10 rankings in a 2003 listing of leading utility "green pricing" programs. Learn more online.
- Read more about *energy right*, the TVA program that promotes residential and small-business energy efficiency.
- Read about TVA's partnership in WasteWise and its commitment to reduce solid wastes and purchase EPA-designated items containing recycled materials.
- Learn how TVA's patented ReCip™ technology provides an environmentally friendly option for wastewater treatment.

WASTEWISE

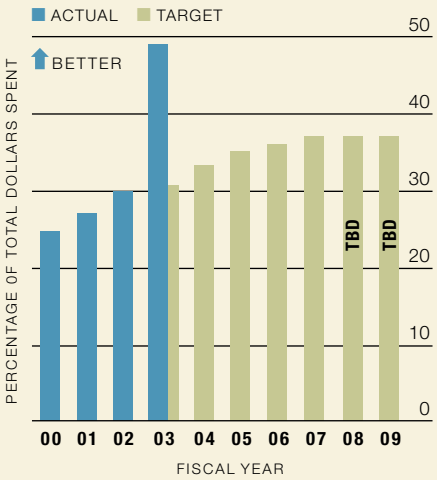
Instead of simply touting the environmental benefits of reducing waste, reusing supplies, and recycling packaging materials and other products, TVA employees strive to be earth-friendly role models through their actions. That's why TVA signed on as a federal charter partner in the EPA's WasteWise program.

Launched in 1994, WasteWise is a voluntary program designed to help companies reduce the solid waste they generate. The 800-plus organizations that participate in the program have made a commitment to achieve results in three areas: reducing solid waste, collecting recyclables, and using recycled materials.

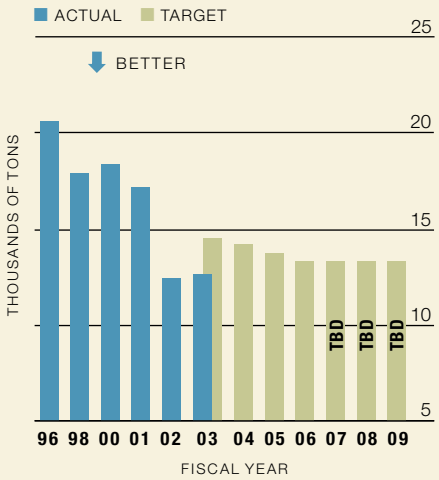
The WasteWise goals match TVA's focus on stimulating economic growth by protecting natural resources and building partnerships for the public benefit.

RECYCLED-CONTENT ITEMS PURCHASED

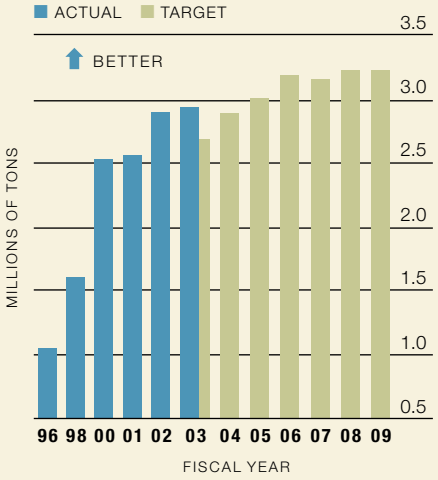
EPA-Designated Items With Recycled Content



SOLID WASTE GOING TO LANDFILLS



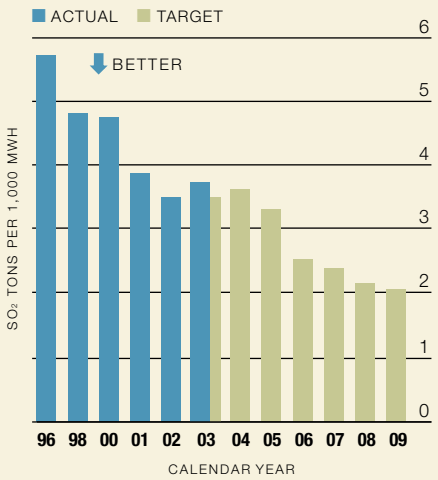
UTILIZATION OF COAL-COMBUSTION PRODUCTS



ENVIRONMENTAL COMPLIANCE

The affordable, reliable electric power generated by TVA, which helps create economic opportunity and a high quality of life in the Tennessee Valley region, is generated by a variety of methods, including fossil, nuclear, and hydropower plants, wind turbines, and solar panels. Coal-burning power plants provide approximately 60 percent of the electricity generated by TVA. These plants emit sulfur dioxide (SO_2) and nitrogen oxides (NO_x), which can affect the region's air quality. In taking a balanced, integrated approach to power generation, TVA is continually looking for ways to reduce emissions more cost-effectively from its fossil plants while still meeting the increasing power demands of consumers.

SO_2 EMISSIONS



2003 reflects an extended outage at Cumberland, higher-sulfur coal usage, and Paradise SCR problems.

Beginning in 2004, targets reflect fiscal year projections.

TVA has spent $4 billion on emissions reductions since 1976 and is currently in the midst of spending on the order of $2 billion more to further reduce emissions. In addition to a $1.3 billion NO_x reduction program, TVA plans to spend $1.5 billion on the installation of five additional flue-gas desulfurization systems, or scrubbers, which help reduce SO_2 emissions from coal-fired plants. The sites where TVA chooses to install scrubbers are those that provide the greatest air quality and regulatory benefit for the investment, including the mountains of east Tennessee and western North Carolina.

When the current program is complete, 11 scrubbers will be operational on units that account for 55 percent of TVA's coal-generation capacity. Six of these scrubbers have already been operating for some time: those on two units at Widows Creek Fossil Plant in Alabama since 1981, two units at Paradise Fossil Plant in Kentucky since 1983, and both units at Cumberland Fossil Plant in middle Tennessee since 1994. This substantial investment in scrubbers underscores TVA's determination to achieve an 85 percent reduction in SO_2 emissions from 1977 levels.

TVA also continues its commitment to reducing its NO_x emissions as it proceeds with one of the most aggressive pollution-control programs in the nation. During 2002–2003, TVA completed four more selective catalytic reduction system installations—one each at Cumberland, Widows Creek, Allen, and Paradise fossil plants—as part of a $1.3 billion NO_x reduction investment. This brings TVA's installed SCR total to eight, and 17 additional SCRs or equivalent systems are scheduled for installation by 2005.

When all the SCR installations are completed, NO_x emissions during the summer ozone season, which lasts from May to September, are projected to be reduced by 75 percent from 1995 levels. During 2002, TVA recorded its lowest SO_2 emissions on record and in 2003 its lowest NO_x emissions, although it missed its ozone season target by 5 percent. These reductions were achieved through the operation of new and existing SCRs and the six scrubbers, and by the burning of low-sulfur coal.

The SCR installations have not been without setbacks. Ash carryover and buildup initially plugged the catalyst on the Paradise Unit 3 SCR, so TVA switched back to a higher-sulfur coal as a short-term fix until components of the SCR could be changed to provide a better, long-term solution. Because of this switch and increases in fossil generation, SO_2 emissions in 2003 exceeded TVA's target by 7 percent. In addition to dealing with the challenges at Paradise, TVA had to delay the installation of the Bull Run SCR from 2003 until 2004 due to the complexity of the installation, which required additional design modifications. Despite these challenges, TVA plans to achieve further SO_2 reductions in

ENVIRONMENTAL COMPLIANCE

2004 by switching to low-sulfur coal at Colbert Fossil Plant Unit 5 and by making scrubber improvements at Widows Creek Unit 8. These steps are expected to help reduce emissions to near or below the record-low 2002 levels, even with increased generation demands.

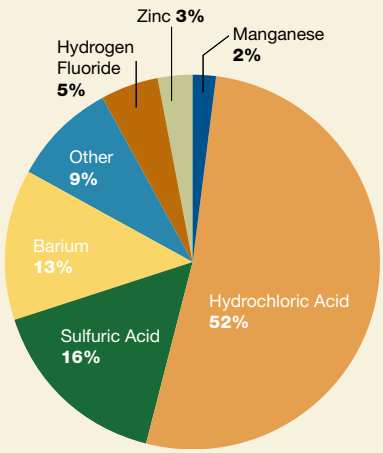
During 2003, TVA continued testing and development of the NOxStar technology, which reduces emissions by creating a plasma within a boiler. This plasma mixes the NOx-containing flue gas with ammonia to reduce NOx emissions without the need for the expensive catalysts required by SCRs. Although NOxStar does not lower NOx emissions as much as an SCR, lower capital costs and ease of installation will enable TVA to add the technology to more units.

An earlier version of NOxStar was installed at Kingston Fossil Plant Unit 9 in 2002 with mixed results. NOx reductions were achieved, but the boiler was damaged. Despite the setback, TVA continues to assess the viability of the NOxStar emissions reduction technology.

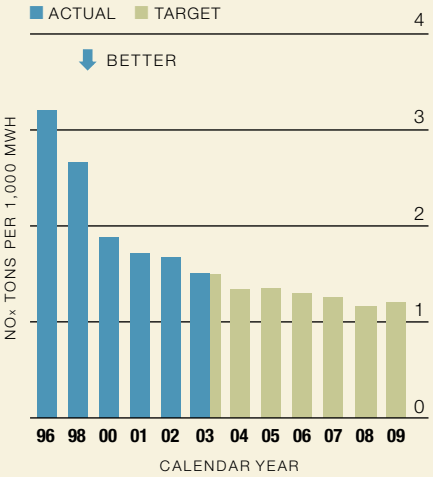
Another area of focus is the chemical emissions produced by TVA's coal-burning plants. The EPA's Toxics Release Inventory (TRI) requires about 31,000 U.S. facilities to report the release of approximately 650 chemicals defined by EPA as potentially hazardous to human health. TVA uses or manufactures (i.e., produces during the combustion of coal) 25 of the chemicals on EPA's list in quantities sufficient to require TRI reporting.

Because TVA operates a large number of fossil-fuel plants, it ranks high among the top TRI-reporting industries in Alabama, Kentucky, and Tennessee.

TOXICS RELEASE INVENTORY
Calendar Year 2002

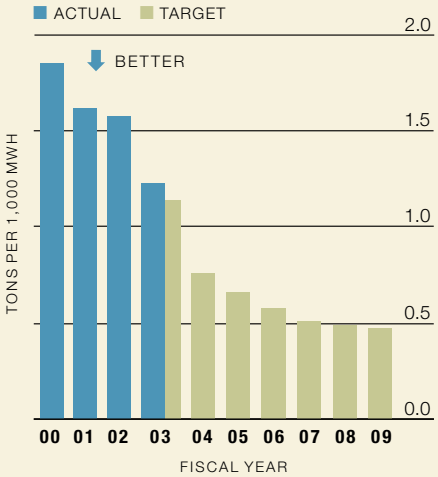


NOx EMISSIONS



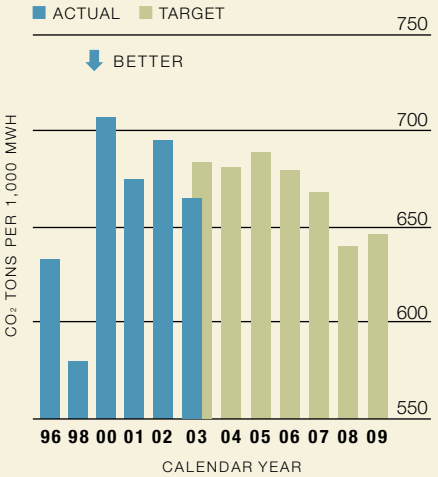
Beginning in 2004, targets reflect fiscal year projections.

NOx OZONE SEASON EMISSIONS
May to September



2003 reflects operational problems with new SCRs coming online.

CO2 EMISSIONS



Beginning in 2004, targets reflect fiscal year projections.

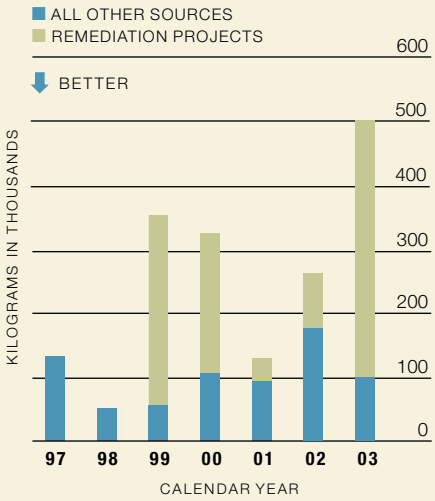
ENVIRONMENTAL COMPLIANCE

TVA voluntarily performs inhalation health-risk assessments for each of its 11 coal-fired plants. They provide estimates of exposure conditions within a radius of 50 kilometers (31 miles) around each facility, the area of greatest potential impact based on meteorology, terrain, and emission levels. These assessments consistently demonstrate that exposures to TVA-emitted TRI chemicals are very low and pose no significant health risk to employees or Valley residents.

TVA continues to work on reducing the production of hazardous waste but its success has been offset by a few large-scale remediation and cleanup projects that increased the total amount generated.

HAZARDOUS WASTE GENERATED

Includes Direct Shipments



2002 and 2003 figures reflect several large scale clean-up and remediation projects: Watts Bar Fossil (2002), Environmental Research Center Firing Range, and the Muscle Shoals Power Service Shops (2003).

Waste production in 2002 increased as a result of the continued cleanup of Watts Bar Fossil Plant, permanently shut down in 1997, which was constructed with materials that have since been identified as posing environmental and health hazards if not handled properly. TVA has undertaken a variety of remediation measures, including removing smokestacks, electrostatic precipitators, and the coal conveyor housing (containing asbestos and lead paint); installing a spill containment pond and new powerhouse roof; and removing and recycling 79,494 liters (21,000 gallons) of turbine oil.

In 2003, remediation work at the Environmental Research Center Firing Range to remove lead-contaminated soil resulting from the accumulation of bullets required the removal and proper disposal of 243,460 kilograms (268 tons) of material. The site's remediation was the primary reason that TVA failed to meet its hazardous waste target for 2003.

An additional area of focus is the low-level radioactive waste generated by TVA's nuclear power plants. TVA missed its 2002 target by approximately 10 percent (98 cubic meters) and its 2003 target by 4 percent (40 cubic meters). These increases were directly related to several unplanned outages, which created additional generation of low-level radioactive waste.

Operations at TVA's nuclear and coal-fired plants have the potential to adversely affect water temperatures. The Clean Water Act requires that, at a minimum, power plant thermal discharges not interfere with the ability to "sustain balanced indigenous aquatic populations." The water must be kept cool enough to protect the health of aquatic life downstream, which is important to anglers, to state regulators, and to TVA.

TVA's Hydrothermal Team is responsible for ensuring that water discharges from nuclear and fossil plants do not cause temperatures downstream to exceed environmental limits. When temperatures begin to approach these limits—typically during hot, dry weather when power demands are greatest—the team conducts around-the-clock monitoring of water temperature data collected by automatic sensors at each plant. Team members also run computer models to see how changes to water release schedules from upstream dams would affect compliance and other river system objectives. The Hydrothermal Team is in constant contact with the coal-fired and nuclear plant managers, sharing information and making operational recommendations. During 2002 and 2003, TVA met water-temperature regulatory limits while providing adequate, reliable power, a particular challenge in 2002, when drought conditions were coupled with critical peak power demands.

While the expectation is that TVA will comply with state and federal environmental regulations, certain

ENVIRONMENTAL COMPLIANCE

events occur that are serious enough to trigger notification to or enforcement action by a regulatory agency. These reportable environmental events (REEs) may include spills or small releases of oil in quantities that can produce a sheen on water.

In 2002, TVA experienced 29 REEs, down from the previous year's 39. However in 2003, the number of REEs increased to 44, exceeding TVA's target of 35. Notices of Violation for paperwork reporting errors and monitoring oversights contributed to the higher-than-expected REE figure for 2003. The three REEs that had the greatest potential effect on the environment are described in detail here:

1. About 568 liters (150 gallons) of insulating oil was spilled from the Unit 2 main transformer at Paradise Fossil Plant. The spill occurred when a fan blade support cracked due to fatigue and heat stress and separated from a fan on the transformer cooler. The blade punctured an oil-containing section of the transformer. Although the majority of the spill was absorbed by the surrounding gravel and soil or contained within a concrete trench, rain washed 133 liters (35 gallons) into the storm-drain system that discharges into the Green River.

   TVA personnel immediately placed absorbent materials within the transformer yard and concrete pipe trench and placed a containment boom around a section of the oil sheen that had moved into the discharge channel. Containment and absorbent booms were also placed on the river to contain and control the oil and oily debris along the bank for recovery and disposal. The gravel, which had absorbed most of this oil, was removed and disposed of properly.

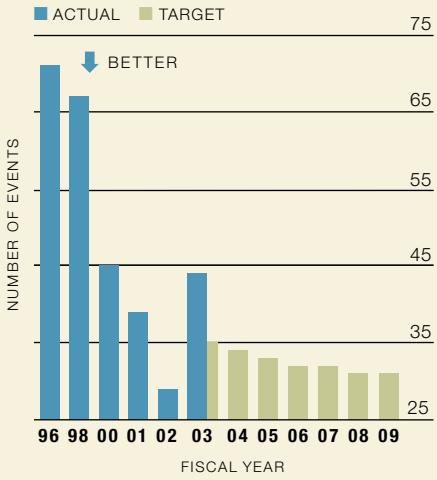
   To prevent similar spills, TVA has implemented additional preventive maintenance procedures, including the inspection of fan blades and construction of a new containment system beneath the transformer.

2. Approximately 5,000 catfish were trapped and subsequently died in the Unit 3 discharge tubes at Watts Bar Hydro Plant in Tennessee. A

"The quality of life in the Tennessee Valley is directly linked to the quality of the air we breathe. TVA's investment in pollution control systems to reduce sulfur dioxide and nitrogen oxide emissions has had a tremendous impact on air quality throughout the Southeast and will continue to improve the environment for future generations."

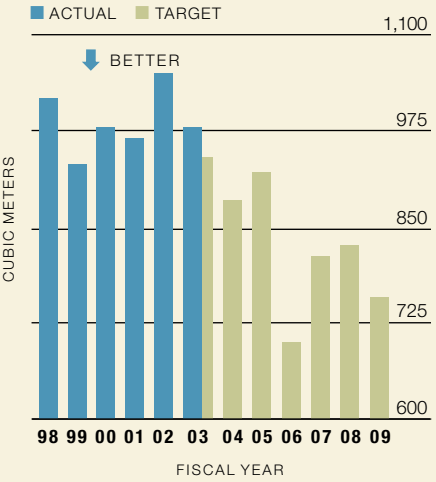
Ron Gore, Chief, Air Division, Alabama Department of Environmental Management

REPORTABLE ENVIRONMENTAL EVENTS



2003 reflects an increase in monitoring and paperwork reporting errors.

LOW-LEVEL RADIOACTIVE WASTE GENERATED



2003 reflects an increase in unplanned outages.

FY 06 target reflects fewer planned outage days.

ENVIRONMENTAL COMPLIANCE

WATTS BAR HYDRO PLANT POWERHOUSE FIRE

Homeowners know that damaged insulation around an electrical cable is a potential fire hazard. But when the insulation is located in a huge power generating facility, the consequences can be catastrophic.

That's what happened in September 2002 at Watts Bar Hydro Plant near Spring City, Tennessee. The incident involved an electrical cable located in a shaft that runs from the powerhouse to the control building. Arcing from the cable to a metal grate ignited the insulation. The fire and subsequent heat and smoke destroyed most of the wiring and controls for the power plant. The resulting power outage made the floodgates and lock at Watts Bar Dam temporarily inoperable. By 9:30 a.m., less than two hours after the fire started, TVA was able to use diesel generators to restore the electrical service required to operate both the gates and lock. Despite the magnitude of the damage, operations for navigation, flood control, thermal cooling-water requirements, and water releases to maintain downstream aquatic habitat continued with little interruption. Unfortunately, approximately 5,000 catfish were trapped and subsequently died in the Unit 3 discharge tubes.

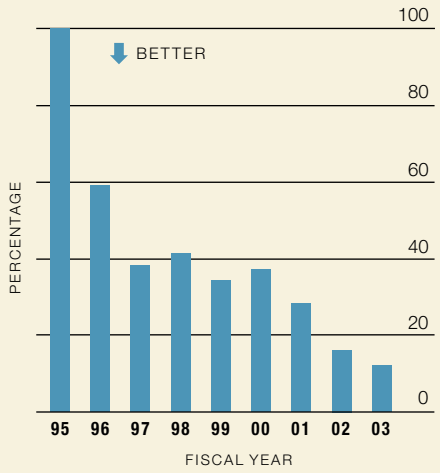
The five generating units at the hydro plant were out of service for several months. However, TVA set an aggressive schedule to complete the repairs and equipment replacement, which cost $21.8 million, and successfully beat that timetable for every unit, allowing the plant to be fully operational by mid-2003. To prevent a similar occurrence at other hydro plants, TVA has enhanced inspections, installed improved ground-detection and fire-detection equipment, and improved emergency-response procedures. In addition, TVA met with state and federal regulatory agencies to discuss environmental issues resulting from the fire.

powerhouse fire (see sidebar) caused a power outage, making it impossible to operate the tube gates. Since the gates couldn't be adjusted, the fish became trapped inside the tube. TVA notified the Tennessee Wildlife Resources Agency (TWRA) and the fish were removed and disposed of. In conjunction with TWRA, TVA is preparing a habitat enhancement plan, scheduled for implementation in spring 2004, to offset the loss of the fish.

3. Sewage discharges at Browns Ferry Nuclear Plant in northern Alabama, a repeat REE, slightly exceeded state limits for suspended solids and fecal coliform bacteria, indicating that the discharged water was contaminated with the fecal material of humans or other animals. The problem was associated with the plant's sewage lagoon. TVA personnel determined that an increased employee population, as well as the presence of waterfowl and other wildlife close to the sampling point, contributed to the elevated reading. TVA temporarily isolated the sewage lagoon, performed a retention study, installed 12 additional aeration systems, and raised the operating water level of the lagoon for more efficient operation.

Employees at TVA plants and other facilities conduct assessments of all REEs. Audits are done by a central staff of environmental specialists to monitor the effectiveness of the Environmental Management System (EMS) at TVA facilities and check for compliance with local, state, and federal regulations. Since 1995, the audit findings have shown a significant downward trend.

PERCENTAGE OF AUDIT FINDINGS COMPARED WITH 1995 BASELINE



STAY CONNECTED

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- TVA's **Bull Run** was named the most efficient coal-fired plant in the nation in 2002 and 2003. Find out more online.
- **Opacity measurement** reveals the amount of light that is obscured by plant emissions. Read how TVA plants comply with opacity standards.
- Cleanup projects such as the one at **Sequoyah Nuclear Plant** can sometimes generate hazardous waste. Learn more online.
- Learn how TVA works to **minimize the environmental impact** of an REE involving an endangered species.
- Find out how TVA's ongoing **commitment to reduce carbon dioxide emissions** helps protect the earth's climate.

PARTNERSHIPS AND PUBLIC INVOLVEMENT

Developing working relationships with local landowners, businesses, other agencies, community groups, and environmental organizations helps TVA promote environmental awareness, gather public input, and respond to the needs and concerns of those who live, work, and play in the Valley.

Through its Watershed Teams, each covering a specific area in the 108,000-square-kilometer (42,000-square-mile) Tennessee River watershed, TVA builds partnerships with citizens at the grassroots level. By maintaining an active, accessible presence throughout the region, TVA's watershed and economic development specialists are able to work with community coalitions to inform people about sustainable land practices and environmental protection, thus linking land use and water quality needs.

These specialists help communities implement model site-design principles, which reduce the environmental impacts of sprawl, improve water quality, reduce flash flooding, preserve natural settings, and optimize the conservation of water resources for the public's benefit. They have been important members of coalitions from the Upper Tennessee and Middle Cumberland River basins, which were awarded EPA grants of $800,000 and $600,000, respectively, to continue their initiatives.

Another innovative TVA partnership is the Green Power Switch Generation Partners demonstration project. This dual-metering option credits the owner of a qualifying power generation system 15 cents per kilowatt-hour for all energy produced using clean wind or solar power. In 2002–2003, TVA's Public Power Institute partnered with the Department of Energy, Oak Ridge National Laboratory, Habitat for Humanity, Loudon County, Lenoir City Utilities Board, and TVA's *energy right* program to build three of five planned Zero Energy Buildings (ZEBs) in Lenoir City, Tennessee. The ZEBs are high-efficiency structures designed to produce as much energy as they use annually. The homes will test and demonstrate innovative technologies such as these: advanced, low-cost zero-power sensors and controls; roofs that change their reflectivity according to the temperature; self-healing caulks and flashings that expand to cover the space; indoor air quality enhancements; and advanced water heating and space conditioning—the integration of a building's heating, ventilation, and air conditioning system within the building enclosure or building envelope.

The first ZEB built by the partnership was a 99-square-meter (1,067-square-foot) Habitat for Humanity home in Lenoir City, Tennessee. Two additional ZEBs were constructed between 2000 and 2003, creating a living laboratory through which sponsors can teach builders, contractors, and homeowners about the advantages of high-efficiency buildings. Two remaining ZEBs will be constructed in 2004, and plans are under way to build similar structures through Habitat for Humanity affiliates in Walker County, Georgia, and Hamilton County, Tennessee.

Addressing air quality issues is the focus of two additional TVA partnerships: the Southern Appalachian Mountains Initiative (SAMI) and the Visibility Improvement State and Tribal Association of the Southeast (VISTAS). TVA was an active partner in SAMI, a voluntary, consensus-based partnership of state and federal environmental agencies, federal land managers, industries, environmental activists, academics, and residents of the Valley. In 2002, SAMI completed an integrated assessment of the sources and effects of air pollution in the southern Appalachians. The results support

"TVA balances progress and stewardship of lakes for recreation, power generation, navigation, and flood control with archaeological investigations and with the concerns of Native Americans. We are pleased with what TVA is doing to protect and preserve irreplaceable historic Native American sites."

Russell Townsend, Deputy Tribal Historic Preservation Officer for the Eastern Band of Cherokee Indians

PARTNERSHIPS AND PUBLIC INVOLVEMENT

current emissions control plans and show that reductions from all sources will be required to significantly improve mountain air quality.

VISTAS is a regional planning organization created to help coordinate activities associated with the management of regional haze and other air quality concerns in the southeastern United States. TVA atmospheric scientists are completing the first six months of a yearlong project that involves sampling the chemical components of airborne fine particles at Look Rock, Tennessee. This is one of four monitoring sites being developed in the Southeast by VISTAS, with co-funding by TVA. Hourly average data are being collected for sulfate, nitrate, organic carbon, and elemental carbon (soot) to determine the present levels and sources of light-scattering aerosols in the region. This information will be the basis for developing an effective program to reduce aerosol levels and improve visibility in Class I scenic areas as mandated by regional haze regulations. TVA and the National Park Service jointly operate the Look Rock site.

A partnership between TVA Cultural Resources and Native Americans focuses on archaeological sites located along TVA reservoirs. According to archaeologists, the history of human life in the Tennessee Valley extends back some 11,000 years. While these early settlements are long gone, irreplaceable links to the Valley's past exist in the form of archaeological remains.

To balance the preservation and protection of prehistoric and historic Native American sites with the stewardship of reservoirs and rivers, TVA partnered with all 18 federally recognized Native American tribes having historical ties to the Valley to host the first-ever Native American Consultation Workshop in 2002. During the day-and-a-half workshop, tribal representatives were able to meet face-to-face with TVA Cultural Resources staff to ask questions, voice concerns, and provide input on geographical regions of particular interest to the tribes. In return, TVA was able to raise awareness among tribal members of the actions TVA is taking to stabilize and protect archaeological sites.

In 2002, TVA stabilized 19 critically eroding archaeological sites along approximately 2.4 kilometers (1.5 miles) of shoreline. Fourteen additional sites were stabilized in these areas during 2003.

Protecting the sites from looters is a more daunting task for TVA. When this occurs, both irreplaceable artifacts and their context—the relationship of artifacts and other cultural remains to each other and to the surroundings in which they are found—are lost forever. To help prevent looting and protect sites, TVA's Cultural Resources staff has partnered with the public in a stewardship project called A Thousand Eyes. The project, which works in concert with TVA Lake Watch (a cooperative effort to reduce crime and accidents on TVA-managed reservoirs and shorelines), trains local volunteers in how to recognize and report suspicious activities, such as someone digging along the reservoir shoreline.

TVA's Cultural Resources staff also makes presentations to Lake Watch groups, students, and community organizations and offers field trips to increase awareness of both prehistoric and historic archaeological sites.

For more information on the preservation of archaeological sites on TVA-managed lands or to schedule a Cultural Resources presentation, visit www.tva.com/river/landandshore/culturalresources.

STAY CONNECTED

At www.tva.com/envreport

- Find out how TVA **gives outdated computer equipment a new lease on life** through donations to Valley schools, nonprofit groups, and minority-owned businesses.
- Partnerships help promote clean boating. TVA and its watershed partners foster sound, environmentally responsible marina and boating practices through the Tennessee Valley **Clean Marina Initiative**.
- Check out **TVA Kids**, the fun and educational Web site created for students, parents, and teachers, at www.tvakids.com.
- Learn how and why TVA's **Ozone Forecasting Team** keeps Valley residents updated on the potential for unhealthy air quality in their communities.

INNOVATION AND TECHNOLOGY

By investing in science and technology, TVA develops the knowledge and tools needed to protect, conserve, and repair the natural resource base that sustains life in the Tennessee Valley. Researching and utilizing new technologies also helps TVA improve its operating efficiency by providing new ways to obtain more kilowatt-hours from the same amount of fuel input.

Using TVA's operating facilities as a living laboratory, scientists at TVA's Public Power Institute apply innovative solutions to actual problems in real-life settings. Through its commitment of time, talent, and funding for technological advancements and innovations, TVA is able to continuously improve its performance, both in delivering affordable, reliable power and in protecting the Valley's natural resources.

For example, TVA is participating with the Department of Energy, the Electric Power Research Institute (EPRI), and EPA in several demonstration projects to determine the effectiveness of technologies to reduce emissions of mercury into the air. Currently, TVA's 11 fossil-fuel plants are estimated to emit 3.2 metric tons (3,500 pounds) of mercury each year.

Early evidence indicates that selective catalytic reduction systems used in combination with scrubbers may convert elemental mercury into a form that can be removed using existing downstream emissions-control equipment. At Paradise Fossil Plant, testing over the past three years has shown that mercury is being converted and removed at a rate of 90 percent when the SCR is operating. This approach would result in significant cost savings by eliminating the need to install additional end-of-pipe, mercury-specific removal technology (which has yet to be developed) to extract the mercury from the combustion gases. TVA researchers are looking at a range of technologies to find the most cost-effective and environmentally sensitive solution for all of TVA's coal-fired power plants.

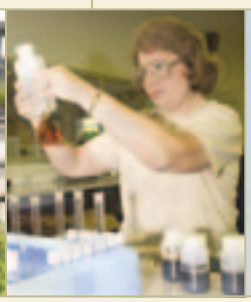
Mercury measurement data collected at Paradise compare TVA's new patented mercury analyzer technology with the industry's current technique for measuring mercury in gases from fossil plant stacks. Preliminary results indicate that the TVA technology provides an immediate, accurate measurement of mercury compared with the current technique, which requires waiting several weeks for lab results. In addition, the TVA approach takes fewer staff to operate, making it more cost-effective. This technology will increase understanding of the chemistry of mercury in a power plant and will help TVA make timely operating decisions to reduce mercury emissions and minimize costs of meeting future mercury emission regulations.

In another innovative project under way at Paradise Fossil Plant, TVA's Public Power Institute was awarded a contract by DOE's National Energy Technology Laboratory in August 2000 to develop new ways of helping electric power producers capture, or sequester, carbon dioxide. The $1.3 million Carbon Capture and Water Emissions Treatment System project, or CCWESTRS (pronounced *sequesters*), evaluates the use of ammoniated wastewater from power plants to irrigate trees, which sequester CO_2 and store it in forms that prevent its reentry into the atmosphere.

CCWESTRS examines carbon sequestration on poorly reclaimed surface-coal-mining land on the Paradise plant site. TVA designed and installed a system to drip wastewater from the flue gas desulfurization

"TVA's well-focused research, development, and testing of advanced mercury emissions control technologies and supporting measurement and monitoring systems promise to provide cost-effective, environmentally sound options in the global effort to reduce mercury air emissions."

Thomas Feeley, Technology Manager, Innovations for Existing Plants Program, Department of Energy



INNOVATION AND TECHNOLOGY

system, or scrubber, over the entire site. The project also included spreading approximately 30,600 cubic meters (40,000 cubic yards) of scrubber sludge, a nontoxic solid-waste by-product from the plant, over the site and planting 63,000 sycamore and sweetgum seedlings. The irrigation system started operating in 2003. TVA estimates that 1.5 to 2 metric tons (1.7 to 2.2 tons) of CO_2 per year will be sequestered by the trees at the site over the next 20 years. In addition to providing an economically competitive and environmentally safe option to offset greenhouse gas emissions, the CCWESTRS technology helps the environment by developing wildlife habitat and green space.

In Muscle Shoals, Alabama, TVA is demonstrating another technology that prevents harmful industrial pollutants from contaminating the environment. Unlike traditional cleanup methods such as scrubbing, stripping, and absorption, which merely reduce the impact of certain pollutants, TVA's patented Hybrid Bioreactor converts toxic pollutants to nontoxic products.

The 8.5-cubic-meter (300-cubic-foot) mobile Hybrid Bioreactor uses a process in which naturally occurring microbes are harnessed to destroy toxic chemicals in the water and air. This toxics disappearing act is accomplished in a single step without releasing any harmful compounds. Contaminated waste streams pass through packing material that contains microorganisms which degrade or mineralize the pollutants into harmless compounds such as water and small amounts of carbon dioxide. In most cases, the Bioreactor provides a cost-saving, environmentally friendly alternative to traditional pollution control or remediation approaches. The technology can be used in a variety of applications ranging from site restoration to industrial compliance.

For TVA, focusing on the future means more than technological research and development. It also means helping develop, support, and challenge the nation's future scientists, engineers, and researchers. As part of this commitment, TVA partnered with DOE, the National Renewable Energy Laboratory, BP Solar, and Home Depot in 2002 to sponsor the first-ever Solar Decathlon. The event brought teams from universities around the country to the National Mall in Washington, D.C., to design and build energy-efficient solar-powered homes.

Like its athletic namesake, the Solar Decathlon consisted of 10 events with different themes that ranged from design and livability to energy balance and interior comfort. The solar decathletes had to supply all the energy for an entire household, including a home-based business. Only the solar energy available within the perimeter of each house could be used to generate the power to compete in all 10 events. Throughout 2004, TVA will provide technical assistance to students preparing for the second Solar Decathlon, which is scheduled for 2005.

One innovative TVA project that will not continue as planned is the Regenesys plant in Columbus, Mississippi. The plant was scheduled to be the nation's first commercial-sized Regenesys energy storage facility, a large-scale, battery-like power storage plant that could store electricity during off-peak periods and retrieve it for use when the need for power increases. In 2003, the RWE Group, which had recently acquired Regenesys Technologies Limited, canceled further development of the flow-cell technology to be used at the plant. This forced TVA to suspend plant construction in May 2003. Since much of the facility has already been completed, TVA will evaluate the site to determine if other technologies can be installed or if other uses for the facility can be found to serve the area.

The Regenesys technology may yet prove viable. Although the project encountered a number of engineering difficulties during its scaling up to a commercial-sized plant, it's possible that these problems can be adequately addressed with sufficient time and investment of resources.

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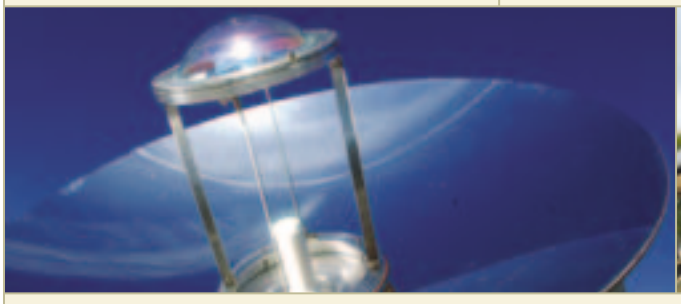
- Find out how TVA is testing **"green" transformer oil**, which could reduce environmental risks and cleanup costs.



A LOOK TO THE FUTURE

Kathryn J. Jackson, Ph.D.
Executive Vice President, River System Operations and Environment, and Environmental Executive

With the adoption of its new Strategic Plan, TVA has recommitted itself to the mission of providing the Tennessee Valley region with affordable and reliable electric power, environmental stewardship, and leadership in sustainable economic development.

We are taking a fresh look at the full portfolio of products and services that TVA provides to find better, more efficient ways to carry out our multipurpose mission. Our Environmental Management System is already helping us reduce our training and procurement costs, and we expect to achieve additional savings by identifying environmental risks and developing low-cost mitigation strategies, and by implementing standardization and process improvements throughout the agency.

This year TVA instituted its second rate increase in 16 years—a 10-year environmental adjustment in our rates that will help pay for further reducing our fossil plant emissions while ensuring that the people of the Tennessee Valley retain access to a diverse generation portfolio.

In 2004, based on the results of our Reservoir Operations Study, the TVA Board will issue its decision concerning how we will operate the reservoir system to create more value for the people of the Valley. Any required changes in operating policy will be implemented over the next few years.

There is considerable uncertainty about the ultimate outcome and timing of electricity market restructuring. Environmental regulations also remain in flux, with a number of competing proposals under consideration by Congress and the Administration. Fuel-price volatility continues at unprecedented levels. All of these factors make it critical that TVA continually evaluate the viability of its generation assets and future capital investments.

While much is changing, one thing remains constant: TVA's commitment to improving the quality of life for the people of the Tennessee Valley. We will continue to reduce the impacts of our operations on the environment. We will work collaboratively with the states and with public and private partners to improve water quality. We will continue the integrated management of the river and power systems to keep power rates low and reliability high. And we will support sustainable economic development that brings and keeps good jobs for the citizens of the Valley.

The next few years will be a time of great change. But great change also brings great opportunities. Opportunities for new partnerships with stakeholders; opportunities for harnessing advances in science and technology; opportunities for increasing the value delivered by our integrated management of the river and power systems; opportunities to help communities grow without increasing stresses on the region's resources.

We at TVA welcome the opportunities that lie ahead.

Kathryn J. Jackson, Ph.D.

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