



Land Air & Water

Kentucky Energy and Environment Cabinet

Volume 21 Number 3
Summer 2010

Land Air & Water

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Land, Air & Water is published quarterly by the Energy and Environment Cabinet. Subscription to this publication is free.

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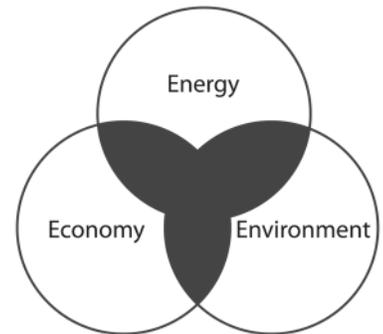
SAVE THE DATE

Governor's Conference on the Environment to take place this fall

The 34th Governor's Conference on the Environment will be held Oct. 20-21 at the Louisville Downtown Marriott.

The creation of the Energy and Environment Cabinet developed a convergence of protecting the environment and exploring ways for Kentucky to become energy independent. The focus of this year's conference is to discuss the link between energy, environment and the economy. Industries, businesses, communities, academia, public servants and individuals will gain valuable knowledge about federal and state legislation that will impact Kentucky's economy and future.

We welcome your input at the conference. For more information, contact Natalie Jensen at 502-564-7192 or at natalieE.jensen@ky.gov.



34th Governor's Conference on the Environment

CORRECTION

On Page 1 of the spring issue, we mistakenly identified the birds in the photograph as osprey. Thanks to the keen observation of our readers, we now know that they are gulls.



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Printed on recycled paper with state and federal funds.

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Features

Muck to energy 2
The Kentucky Horse Park will turn 3,450 tons of horse muck into gas to generate electricity.

Blasting guide 4
Answers to questions about the effects of blasting to homes.

In the footsteps of an inspector 8
Allison Fleck accompanies Mitzi Delius on her daily rounds in central Kentucky.

Ozone's effects on plants 17
Scientists and students study native plant sensitivity to ozone in the Great Smoky Mountains National Park.

Contents

Save the date	Inside cover
Mine rescue teams hone skills in emergency drill	1
Wetland pond at McConnell Springs will improve water quality	3
Kentucky and Virginia partner in first interstate Arbor Day celebration	5
Inspect it and they will come	6
Legislative updates	7
This ozone season: take action	9
Setting a 'green' example in Woodford County	11
Dead animal dilemma	13
Frankfort citizens sketch visions of their community's future	14
Earth Day celebrates 40 years	15
Kentuckians answer call to purchase energy-efficient appliances	16
KDF firefighters attend Interagency Wildland Fire Training Academy	18
Awards	19-20
Seedling nurseries: growing trees for healthy and productive forests	Back cover

*Printed by Post Printing
Lexington, Kentucky*

Our Cover



Passion-flower (*Passiflora incarnata*)
This herbaceous vine blooms from June to September. A pulpy fruit or "may-pop" develops after flowering and can be harvested from July through October. Its name is said to come from Christian theology regarding the crucifixion based on the unique physical structure and the number of various flower parts. Photographed by Martina Hines, KSNPC.

Mine rescue teams hone skills in emergency drill

Drills vital to mine rescue preparedness

By Evan Satterwhite
Department for Natural Resources

“These are real tough men, practicing a real tough job,” said Ronnie Drake of the Office of Mine Safety and Licensing. “These guys are passionate about the business of mine rescue.”



TOP RIGHT: A team member performs communications procedures during the drill.

TOP: Rescue teams wear necessary equipment for encountering smoke-filled, unventilated areas of the mine.

ABOVE: Simulating the rescue of an injured miner is performed during the drill.
OMSL photos

Recent mining disasters were fresh on the minds of the 12 signature rescue teams competing at Jenny Wiley State park on April 14-15 near Prestonsburg, Ky. Completion of the mine rescue drills by Office of Mine Safety and Licensing (OMSL) mine rescue personnel fulfill one of several important requirements mandated by the federal Miner Act. Similar contests are regularly scheduled throughout the year to continually hone and update the skills of Kentucky’s mine rescue teams. Teams are judged on their ability to safely handle several dangerous scenarios and surprise situations that are simulated during the exercise.

This intensive training, conducted under strict rules and procedures, prepares mine rescue personnel for command center and mine rescue operations in the event they are required to respond to a

major mine disaster. The team members are mine inspectors, safety analysts or supervisors who work for OMSL on a full-time basis and are very familiar with the mines in their respective districts.

Teams waiting to compete are held in a large room for up to eight hours, just as they would at a real mine disaster, waiting to be called to go into the mine. They arrive on the practice field not knowing the situation that exists.

First, the team reports to the fresh-air base to set up communications between a briefing officer and the team. They are provided with maps and a scenario of the known situation inside the mine and are given five minutes to review them before starting their entry. They enter the simulated mine and concentrate on improving ventilation, making bi-directional gas checks, testing the walls and roof for stability, and building supports where necessary. When encountered, they remove any miners while concurrently dealing with other problems that may arise.

All of this is performed while carrying heavy equipment and using a breathing apparatus that significantly increases the difficulty of the exercise. Because visibility may be hampered by smoke and noise during the simulated rescue, maintaining accountability of all members is

Continued on Page 20

Kentucky Horse Park turns *muck into energy*



By Allison Fleck
Division of Water

The Kentucky Horse Park (KHP), located near Lexington in the heart of horse country, is known the world over as the jewel in the horse capital's crown. The recent 2010 Three-Day Event and upcoming World Equestrian Games confirm the park's luster as an equine mecca.

Now the facility will add a "green" gemstone to its crown with the introduction of a biomass gasification plant that will turn 3,450 tons of horse muck produced annually at the park into gas that can generate about 1.6 megawatts of electricity.

In a press conference announcing the energy-saving project, John Nicholson, executive director of KHP, said the move to greater efficiency and environmental stewardship are "the right thing to do."

"It is imperative that we protect and improve the integrity of our land, water and air, which have had fundamental roles in making Kentucky the Horse Capital of the World," said Nicholson.

Gasification is a controlled, self-contained method of oxidizing organic



material at stable, controlled temperatures. It was widely used in the late 1800s until the use of oil and natural gas became more popular. A gasification system such as one for utilizing horse muck as fuel basically consists of a gasifier unit and energy converters—burner or engine. Generators can be driven by the gasification unit to produce electricity.

The conversion plant is the centerpiece of a \$5.7 million energy overhaul designed to save the park more than half a million dollars a year. The plan also includes a solar-powered trash compactor,

new sewer lines and filtration upgrades, solar-powered lighting of the covered arena and solar-powered heaters at the campground. It also will provide a new purification system for the campground swimming pool, which cuts down on chemicals and pumping costs.

Muck is the mixture of manure, urine and bedding cleaned from stalls daily. Equine waste is more than a disposal problem; horse manure and used bedding attract insect pests and vermin, produce unpleasant odors and can contaminate water sources due to runoff.

Park officials said the need to meet high standards to avoid environmental contamination was a major factor in instituting the new system. They believe the project will help in maintaining the unnamed tributaries to Cane Run, which is a major tributary of North Elkhorn Creek.

The manure bioenergy management facility will use agriculture waste and other biomass materials to produce so-called "producer gas" for thermal power and/or electricity generation. The facility will produce less greenhouse gases than the continued transport of muck to a landfill.

The project received federal stimulus funds through the American Recovery and Reinvestment Act and low-interest loans through the Kentucky Clean Water State Revolving Fund. The Kentucky Division of Water worked with the Kentucky Infrastructure Authority to process the application and perform technical reviews. Plans for these improvements should be in place in time for the Alltech FEI World Equestrian Games being held at the park in September.

Kentucky Horse Park photo obtained via their Web site at <http://www.kyhorsepark.com/>



Wetland pond at McConnell Springs will improve water quality

Funding provided by Clean Water Act grant

**By Allison Fleck
Division of Water**

The completed boardwalk circles the wetland, allowing visitors a close encounter with a variety of wildlife. The boardwalk also leads to McConnell Springs' hiking trails that wind through the nature park.
Photo by Lexington-Fayette Urban County Government

A half-million-dollar wetlands project recently completed at McConnell Springs Nature Area in Lexington will help control the impact of storm water as it flows through the area's sensitive karst geologic features while improving habitat for birds, animals and fish.

McConnell Springs is a 26-acre natural and historic site located on the northeast side of Lexington between Old Frankfort Pike and Versailles Road. The park was part of a 1,200-acre tract selected by William McConnell in 1775 as a grant from Virginia when he and his party came to the area to perform surveys and establish a town.

Through the years, McConnell Springs—a National Registered Historic Site—was the site of a mill, a gunpowder factory, a distillery and a dairy farm. As Lexington grew, the area became engulfed by urban growth and industry, making it particularly vulnerable to the effects of storm water runoff and nonpoint source pollution.

In 1993, the Friends of McConnell Springs formed to reclaim the site, which had been donated to the Lexington-Fayette Urban County Government for parkland. The members cleared hundreds of tons of trash and construction debris and began to develop the site as a wildlife habitat and park.

The spring's location and sinking nature, however, continued to make it a receptacle for pollution. Debris and trash from roadway storm drains and runoff from industrial, business and residential areas was degrading the water quality and the wetlands area.

Grant information

The project was partially funded in 2003 through a federal 319(h) non-point source pollution grant of \$524,000 administered by the Kentucky Division of Water. The city of Lexington provided a 40 percent nonfederal match.

Funding through Section 319(h) of the Clean Water Act is provided to the Kentucky Nonpoint Source (NPS) Pollution Control Program from the U.S. Environmental Protection Agency. Section 319(h) makes available grants for watershed-based plan development and implementation, protection of Special Use Waters with identified threats, as well as other nonpoint source pollution control projects to help mitigate or prevent runoff pollution.

The grant program is administered by the Kentucky Division of Water Nonpoint Source and Basin Team Section. This year, the DOW will award nearly \$2.3 million in NPS grants.

The goal of the McConnell Springs storm water quality project is to use best management practices and natural processes to filter and clean the water before it re-enters the groundwater stream. To accomplish this, water entering the area is channeled through a cage device at a pre-treatment basin to screen out large debris. The water then passes through three ponds and a one-acre wetland.

Wetlands help purify water by allowing for slow filtration through soil layers while providing habitat for fish and wildlife.

Educational components of the project included construction of an extensive boardwalk with observation stations around the pond. In addition, educational tours, workshops and signage demonstrate the benefits of storm water treatment practices and the importance of reducing nonpoint source pollution.

At a ribbon-cutting ceremony held on Earth Day 2010 at the spring, Lexington Mayor Jim Newberry celebrated the completion of the project.

"Thanks to the hard work of many volunteers, [McConnell Springs] is now an environmental gem in the middle of our city," Newberry said.

Blasting: a citizens' guide

Article and photo provided by the Explosives and Blasting Branch

Blasting occurs during many operations—from the installation of utility lines, to fracturing limestone for roads, to fragmenting overburden when mining coal. Small amounts of explosives are also used in the demolition of buildings and in some cases when installing utility poles. The following is a brief overview on blasting:

Q: Why do companies blast?

A: Explosives are used in construction, quarrying and mining to fragment rock layers so that mechanized equipment can move it. The Division of Mine Reclamation and Enforcement's Explosives and Blasting Branch licenses all blasters and issues all permits for explosives purchases and storage facilities. In addition, they inspect and regulate all statewide blasting operations. Citizens close to these operations may request inspections at any time.

Q: What causes a house to shake?

A: Although proper blasting design controls the adverse effects of explosives outside the blast area, people can feel the effects of blasting operations. When explosives are detonated in rock, two things happen—a shock wave is produced and gas pressure is formed. The shock wave creates micro fractures around the blast hole—limited to a few diameters of the blast hole, but generally 30 feet or less. As the gas expands into these fractures, the rock breaks. In fact, the gas pressure is what physically fragments the rock. Each blast is designed to consume the energy produced by the explosives. However, a small amount of energy will radiate away from the blast site.

The ground movement that one feels is from the shock wave, while the venting of the expanding gas and movement of the air caused by the displaced material will create a slight air overpressure. What you “feel” inside the house is a combination of



An operator drills holes for a trench line blast for installation of a sewer line in Madison County.

both effects.

Ground vibrations travel through the Earth at several thousands feet per second, while the effects to the atmosphere move at approximately the speed of sound. How your house will respond depends on several factors that are related to the type of blasting operation, distance to your property and the weather.

For example, trench blasting for a sewer line in the middle of a street in front of a house will create a high frequency shock wave, but very little air overpressure. These vibrations pass very quickly. On the other hand, one's house will respond noticeably longer from blasting that occurs on a surface coal mine because greater volumes of material must be moved, requiring larger blast designs than those needed for a trench.

Often blasts are hundreds of feet away, and the ground movement begins to slow its rate of travel due to the distance. Even when farther away, ground vibration will reach your property before the air overpressure, so your home might respond for several seconds.

Atmospheric conditions can cause air overpressure to produce different effects from similar blasts. On a clear day, pressure is dissipated vertically, but low clouds will cause the air wave to reflect and it can cause a structure to respond at a greater distance. A low-level change in air pressure can cause windows to rattle, an effect similar to a clap of thunder.

Q: If my house shakes, will there be damage?

A: The U.S. Bureau of Mines (USMB) performed thorough research on the effects of coal mine blasting on residential structures, which involved mounting seismographs inside homes adjacent to a mine site and making observations during the blasts. The seismograph measures the velocity of the ground

vibrations and records the rise in air pressure exceeding ambient conditions. Higher velocity numbers translate to the increased possibility of structural damage.

Other studies involved different types of blasts for construction and quarry operations. Mechanical shakers were installed in a test home to determine the actual effects of repeated vibrations. The results indicate that damage did not occur. Additional studies are ongoing to determine how homes respond to air overpressure and ground movement.

Q: How is blasting regulated?

A: The USMB's reports, combined with recommendations from other research studies, provide the basis for current regulations. Kentucky's laws and regulations restrict ground movement and air overpressure to specific limits depending on the type of blasting operation.

Records are kept on explosives from manufacture to end-use. The Explosives and Blasting Branch cross checks records

Continued on Page 12



Kentucky and Virginia partner in first interstate Arbor Day celebration

Students from both states plant seedlings to create a 'forest without borders'

By Evan Satterwhite and Linda Potter
Department for Natural Resources

In April, 100 students and their teachers from Arlie Boggs Elementary in Letcher County, Ky., and Appalachia Elementary in Wise County, Va., planted more than 1,000 native hardwood seedlings and wetland plants to promote reforestation and wetland creation on mined lands. The event was hosted by the Cumberland River Coal Co. on its coal surface mining operation located on the Kentucky-Virginia state line.

Tree species planted included blight resistant American chestnut, red oak, black walnut, yellow poplar, green ash and red maple.

Hank List, deputy secretary of the Energy and Environment Cabinet, thanked the students for taking the time and making an effort to help plant some Appalachian

hardwood tree seedlings on the mine site.

"We should be able to come back in the future and see a real forest growing on this site," said List.

Mini-workshops led by Tom Biebighauser of the U.S. Forest Service focused on establishing forested wetlands and provided participants an introduction in creating wetlands on mined lands. The students planted native plants provided by the Department of Fish and Wildlife Resources around several wetland areas on the site.

Reforestation of previously mined lands has been encouraged in Kentucky since the Department for Natural Resources (DNR) and the University of Kentucky began researching its viability in

1996. Loose soil prepared according to specific Forestry Reclamation Approach (FRA) guidelines has resulted in greater tree growth, both in height and survival rates, than many virgin forest soils. Planting native hardwoods provides landowners with a sustainable source of income, improves water quality and offers habitat for forest animals.

Wetlands construction is a new partnership with DNR and the forest service, which promises to complement the reforestation initiative by interspersing wetland areas in the forest. Water fowl, dragonflies and salamanders gravitate to the wetlands providing yet another natural feature to the previously mined lands.

Following the tree planting event, the DNR presented International Coal Group East Kentucky LLC with the Appalachian Regional Reforestation Initiative (ARRI) award for their reclamation efforts using FRA guidelines (see sidebar).

Representatives from the Kentucky Energy and Environment Cabinet, the U.S. Office of Surface Mining, Kentucky Department for Natural Resources, Virginia Department of Mines, Minerals and Energy, and ARRI organized and participated in the event.

Larry Arnett (background at podium), deputy commissioner of DNR, announces the 2009 Kentucky Appalachian Regional Reforestation Initiative (ARRI) award winner, International Coal Group (ICG) East Kentucky LLC, for their Peelpoplar facility near Ransom in Pike County. ICG is a strong advocate of FRA in their reclamation efforts. In 2008, they began collaborative work with the University of Kentucky in a research project to determine the implications for use of FRA on long, steep slopes.

According to Arnett, "The reforestation of Kentucky is of primary importance and a long-term goal of DNR. I am pleased with the ongoing efforts of ICG, the University of Kentucky and the department in achieving progress of this goal."

Photo (above) Deputy Secretary Hank List (holding the plaque) presents the award to Don Gibson, Roger Mason and Alan Ashley.

Photo (left): Frank "Joe" Metzmeier of the U.S. Forest Service helps children plant native hardwood seedlings during the event.

Photos by Gail Smith, OSM

The MFP is a former low-level nuclear waste disposal facility located near Hillsboro in Fleming County, Ky. It includes an inactive radioactive waste landfill and a 464-acre buffer zone. The entire project encompasses 770 acres. The facility was operated commercially by Nuclear Engineering Co. (NECO) from 1962-1977 during which an estimated 4,750,000 cubic feet of nuclear and mixed wastes were buried in unlined, shallow earth trenches. Commercial disposal of waste ceased in 1977 due to a four-year environmental study conducted by the Commonwealth that proved trench leachate was migrating through subsurface geology into unrestricted areas and into surface waters.

In 1978, the Commonwealth purchased NECO's leasehold estate and right to Maxey Flats Disposal Site and began contracting maintenance and stabilization efforts. In 1986, the MFP was placed on the U.S. EPA's National Priority List of sites to be evaluated under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), which led to its inclusion as a Superfund site. The Kentucky Cabinet for Health and Family Services and the U.S. Nuclear Regulatory Commission continue to exercise jurisdiction of the MFP under the Atomic Energy Act.

From the time of inclusion into the Superfund Program, the MFP has completed a pre-remedial and initial-remedial phase, which included construction of a temporary cap and pumping of more than 700,000 gallons of trench leachate that was solidified and disposed of onsite in concrete bunkers. Upon completion of the initial remedial activities in October 2003, the MFP was placed in

Continued on Page 19



Inspect it and they will come

By Tom Stewart
Division of Waste Management

The leaves had begun to bud, and pollen had painted everything with a yellow-green coat. It was the signal for an undesirable, yet essential ritual at Kentucky's shallow burial nuclear waste disposal site. Each spring, the Maxey Flats Project (MFP) conducts a comprehensive annual site inspection, which includes close scrutiny of a 55-acre geomembrane cap that covers most of the fenced-in radiological restricted area. The cap is a thick, incredibly resilient polypropylene "tarp" that can withstand utility terrain vehicle travel.

The cap began arriving by truckload in January 2001 in 70-foot by 100-foot panels from a factory in Westfield, N.C. It was welded together onsite using specialized equipment to create a giant, confluent layer. Completed in 2003, the cap continues to function as designed toward its primary goal—to prevent the infiltration of rainwater into the burial trenches.

The annual inspection of the cap comprises two main aspects—air lancing and visual. Air lancing involves stressing

the approximately 12 miles of field seams using an air compressor and low pressure air wands to ensure the onsite welding has remained intact.

For the visual portion, Division of Waste Management (DWM) volunteers visually scan for defects over every square foot of the sea of black plastic. Police lines are formed, and the sheer number of people assures defects are detected in a manner that would be logistically impossible for the current MFP staff of five. In April, nine volunteers participated in the annual visual inspection, finding 20 defects that will require prompt repair by the MFP.

Volunteers are an essential element of the visual inspection. MFP staff makes every effort to ensure they feel appreciated by making the day about more than just the inspection. Questions are answered, current tasks are discussed, and a tour of the facility is provided, which in-



cludes a brief demonstration on everyday sources of radiation. Funding has also been available to provide lunch for the inspection crews.

So, next year when the pollen begins to settle, DWM staff are encouraged to lace up their walking shoes and volunteer to take part in the annual Maxey Flats inspection.

TOP: An aerial view of Maxey Flats.

ABOVE: MFP staff and volunteers scan the cap for defects. MFP photos

LEGISLATIVE UPDATES

The Kentucky General Assembly recently enacted legislation that addresses issues related to the Energy and Environment Cabinet. These bills will take effect in July.

DEPARTMENT FOR NATURAL RESOURCES

House Bill 283

The statutes that establish permit fees the Division of Mine Permits (DMP) assesses on original applications, major and minor revisions, renewals and transfers includes language that indicates permit fees shall bear a reasonable relationship to the cost of processing an application. These amounts have been capped at \$375 since 1982 and could not be changed without legislative action. The bill increases amounts for all permit application types from a flat rate of \$375 per application to:

- \$2,500 for an original application
- \$1,750 for a major revision or amendment
- \$750 for a minor revision, renewal or transfer

House Bill 283 took effect April 8 upon signature of the governor. To ensure the division benefited from the increased permit fees, KRS 350.139 was amended to direct all amounts over the original \$375 be deposited into an account strictly for the use of the DMP. One-third of the original amount will continue to be transferred to the fiscal courts of the county in which the permitted operation is located.

House Bill 268

In an attempt to decrease the number of fly rock incidents throughout the Commonwealth, the Division of Mine Reclamation and Enforcement (DMRE) proposed to increase the number of training hours required to renew a blaster license. This proposal increased the number from 16 hours over a three-year period to eight hours annually over a three-year period. This is a net increase of eight hours and only allows four of those hours to be obtained from attending a conference unless otherwise approved by the department.

In the closing days of the legislative session the provisions of Senate Bill 63 were attached to HB 268. These provisions

increased the amount of mining subsidence insurance from \$100,000 to \$300,000 per structure.

House Bill 215

This bill was originally filed to fix technical issues with a statute pertaining to nature preserves. With an agreement from industry and cabinet representatives, a provision to allow the DMRE to send Notices of Noncompliance and Cessation Orders via electronic certified mail was attached to HB 215. This proposal will significantly decrease the amount of money the division spends sending these documents out by standard certified mail. In addition, it will increase the speed at which these documents are delivered.

DIVISION OF WASTE MANAGEMENT—UNDERGROUND STORAGE TANK BRANCH

Lawmakers passed House Bill 124 and House Bill 378 that will respectively extend select deadlines and lift a restriction in the Kentucky Revised Statutes relating to underground storage tanks (USTs). These changes primarily pertain to the Petroleum Storage Tank Environmental Assurance Fund (PSTEAF).

The PSTEAF was created to assist owners and operators of petroleum USTs in meeting the federal financial responsibility requirement and by providing reimbursement of eligible corrective action costs due to releases from petroleum UST systems. The PSTEAF has three subaccounts—the Financial Responsibility Account (FRA), the Petroleum Storage Tank Account (PSTA) and the Small Owners Tank Removal Account (SOTRA).

House Bill 124

This bill will extend the fund deadlines in these sections of KRS 224.60 in

the following ways :

KRS 224.60-142(2) The owner of any petroleum storage tank containing motor fuels currently existing, or removed from the ground after Jan. 1, 1974, shall register the petroleum storage tank containing motor fuels with the cabinet prior to applying to the fund, and shall register the petroleum storage tank containing motor fuels by July 15, 2013. Owners or operators may submit affidavits and applications relevant to current petroleum storage tank accounts through July 15, 2013.

KRS 224.60-145(8) ... the small operator assistance account and small operator tank removal account established under KRS 224.60-130 shall continue in effect until July 15, 2013, and thereafter until all eligible claims related to tanks registered by that date are resolved, and sufficient money shall be allocated to and maintained in that account to assure prompt payment of all eligible claims, and to provide for removal of tanks for eligible owners and operators as directed by this chapter.

KRS 224.60-130(1)(e) ... Reimbursements of corrective action projects performed under the petroleum storage tank account shall be carried out on or before July 15, 2016. Any corrective action costs incurred after this date shall not be eligible for reimbursement under the petroleum storage tank account ...

House Bill 378

This bill will lift the restriction on the number of tanks owned for SOTRA eligibility in the following section of KRS 224.60:

KRS 224.60-130(1)(j) ... The division shall not place a limit on the number of tanks that an owner or operator has in order to be eligible to participate in the program (SOTRA) and receive reimbursement under this paragraph; ...

FIELD DUTY

A DAY IN THE LIFE OF AN ENVIRONMENTAL INSPECTOR

By Allison Fleck
Division of Water

Mitzi Delius is one of 40 environmental inspectors working for the Division of Water in 10 regional offices across the state. It is her job to inspect and investigate sources of pollution to protect the public and environment and to ensure compliance with state and federal regulations. Each day and each region presents a unique set of challenges and situations. While this article focuses on only one individual, it is written as a tribute to the hard work of all field staff.

“The job of the field inspector is one of the most challenging in this division,” says Tom Gabbard, branch manager of the DOW Compliance and Technical Assistance Branch. “They must have a vast knowledge base, excellent social skills and physical endurance to meet the public in many different situations and locations. They are the eyes and ears of the division. In fact, they are the face of this agency and are critical to our mission.”

“Those boots look mighty clean,” observed Mitzi Delius, leaning over her desk to scrutinize my footwear. “I may have some Wal-Mart bags around here you can use.”

I considered my brand-new hiking boots perfect for following in the footsteps of the Kentucky Division of Water (DOW) field inspector on her daily rounds.

Delius’s words proved prophetic by the end of the day. She has worked for nine years as an environmental inspector in the Frankfort Regional Office of the Compliance and Technical Assistance Branch. She says the challenges of the job are what make it so appealing to her.

“It’s something different every time you’re out,” said Delius, as she maneuvered the four-wheel drive SUV through a farm gate. “I really love the interaction with all the different people. This is a job that definitely requires people skills. There are a few who don’t like seeing you come on their land, but I find that once I start talking to them and explain I’m there to help them fix a problem, they usually calm down.”

A small group gathers near a stream on private land that has been impacted by a major pipeline project. Among them is Joyce Fry with the DOW Water Quality Certification Section, who is overseeing the stream mitigation

project, as well as representatives from the U.S. Army Corps of Engineers, the contracted environmental consulting firm, the construction company and the landowner.

“This whole thing came about as a result of a citizen report,” Delius explains. “I recognized this was a violation of the stream construction permit. It’s really gratifying to see how well the area is being restored to pre-impact condition.”

Delius said citizen reports are an important source of information about potential environmental problems.

“It’s a big help when citizens are aware of their surroundings and take the time to report problems or questionable activities,” she said.

It was another citizen complaint that led to our next stop at a composting business in rural Fayette County. Delius monitors the company’s efforts to dispose of leachate in an environmentally sound manner. She greets the employees by name and follows their truck across a pitted cattle field, coming to a stop at an oversized hose reel beside a farm pond.

“Has it got any fish in it?” she asked.

“Oh yes,” is the response. “You can see it’s pretty clear. There’s no more muck runoff from where we’re spreading it on the field from that hose. We’ve cut back on the volume like you told us and won’t spread it if the ground is saturated.”

Satisfied with their progress, Delius says she’ll be back on Friday.

Asked if she ever found herself in a dangerous situation while performing her job—usually alone and often in secluded locations—she replies, “I’ve never felt threatened to the point of getting in my truck and leaving, but I’m aware of my surroundings and take precautions, like taking someone with me if I feel the need.”

Delius describes one of the more amusing incidents that took place in a cattle field in Clark County where she was sampling a creek.

“I looked up and there was a camel with its head stuck in the back door of my truck,” she said. “That was unexpected.”

While Delius may not know a lot about camels, she does know a lot about the various DOW programs.

“Field inspectors have to be knowledgeable about all the



Mitzi Delius inspects a wastewater treatment plant in Woodford County. Photos by Allison Fleck

Continued on Page 12

THIS OZONE SEASON:

By Roberta Burnes
Division for Air Quality

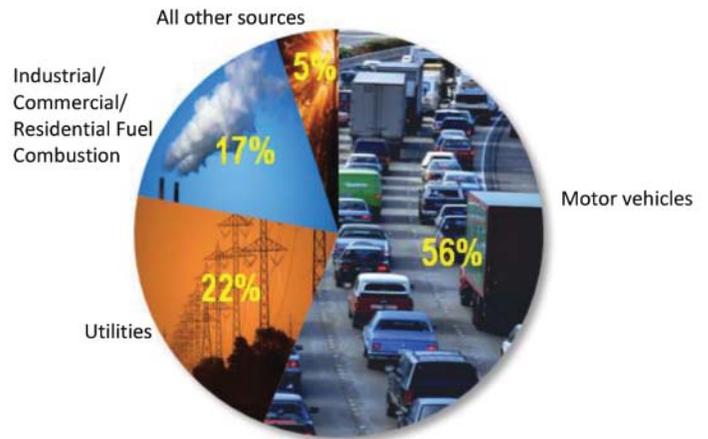
Whether you're grilling out, vacationing, playing sports or just mowing your lawn, summer is naturally a time for outdoor activity. Yet many of the things that make summer *summer*—warm weather, sunshine, lawn mowing and even travelling—can actually contribute to the formation of ground-level ozone pollution. So while you're enjoying yourself in the great outdoors, that “fresh” air you're breathing is more likely to be polluted with lung-irritating ozone during the summer months.

What is Ground-Level Ozone?

It is a major component of smog. It forms through a chemical reaction between volatile organic compounds (VOCs) and nitrogen oxides (NOx) in the presence of heat and strong sunlight. Nitrogen oxides form when fossil fuels are burned; sources include motor vehicles, electric power plants and other industrial, commercial, and residential sources that burn fuel. VOCs come from a variety of sources including motor vehicles, lawn and garden equipment, gasoline vapors, industrial emissions and chemical solvents as well as natural sources. Since sunlight and heat are factors in ozone formation, ozone levels are usually higher during summer months. In Kentucky, ozone monitoring season runs from March 1 through Oct. 31 each year.

Controlling for ozone can be more complicated than for other pollutants for a variety of reasons. Ozone is the only major air pollutant that's essentially a *secondary* pollutant—that is, ozone

Sources of NOx



is never emitted directly into the atmosphere through a smokestack or tailpipe, but forms in the atmosphere through chemical reactions. The chemistry of ozone means weather is an important factor in its formation; hot, sunny days are far more conducive to the chemical reactions that create ozone than cool, cloudy days. Wind can carry ozone and the pollutants that form it hundreds of miles from their original sources, making ozone a problem even in rural areas.

Thanks to its extra oxygen atom, ozone is a very powerful oxidizing agent (think “rust”), second in strength only to fluorine. Even at very low concentrations, this reactive gas is irritating and toxic.

Risks of Exposure to Ozone

Ozone can cause inflammation of the respiratory tract, resulting in breathing difficulty, coughing and throat irritation. Symptoms are more severe in people with respiratory or pulmonary illnesses, in children and the elderly, and in people who are physically active outdoors. Medical studies have shown that ozone actually damages lung tissue and complete recovery may take several days after exposure has ended.

Humans aren't the only ones at risk from exposure to ozone. Ground-level ozone

Ozone can cause inflammation of the respiratory tract, resulting in breathing difficulty, coughing and throat irritation. Young children and the elderly are especially vulnerable to these symptoms caused by ozone. Photo obtained on the AirNow Web site at <http://airnow.gov>.

GRAPHS created by Roberta Burnes



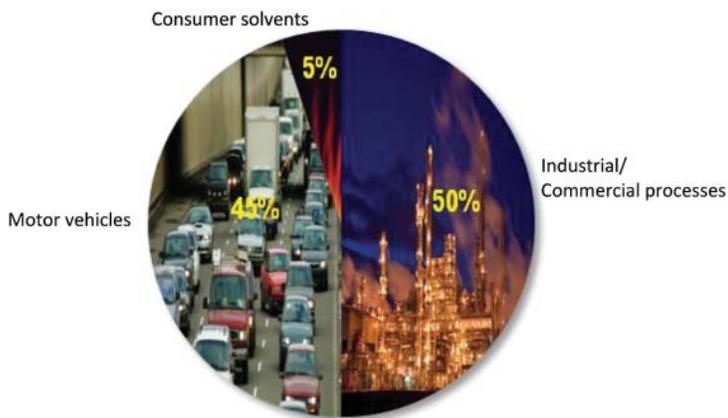
TAKE ACTION

can also cause visible damage to plants—damage that can impair the plant’s ability to photosynthesize. Native plants as well as agricultural crops can be significantly impacted by exposure to ozone (see *Monitoring ozone with plants* on Page 17).

Ozone Standards

For all of these reasons, ozone is one of the six “criteria pollutants” for which National Ambient Air Quality Standards (NAAQS) have been established, as directed by the Clean Air Act. (The other criteria pollutants are lead, sulfur dioxide, particulate matter, carbon monoxide and nitrogen oxides.) Every five years, the U.S. Environmental Protection Agency (EPA) is required to review the current standards for each of these pollutants to ensure they adequately protect public health (read *EPA Revises Multiple National Standards for Criteria Air Pollutants* in the spring 2010 issue of *Land, Air, & Water*).

Sources of VOCs



Earlier this year, the EPA finished taking comments on a proposal to tighten the ozone standards in order to better protect human health as well as sensitive vegetation and ecosystems. The proposed revisions are based on scientific evidence about ozone and its effects on people and the environment.

Slated to be finalized in August 2010, these stricter ozone standards could find many new counties in Kentucky facing non-attainment of the revised standards—that is, their ambient levels of ozone could be found to exceed the new standards. The Division for Air Quality will partner with those counties to develop plans to reduce ozone levels below the limits established by the EPA. Successful ozone-reduction programs utilize a combination of community and government policy as well as individual, voluntary action plans.

How Can You Reduce Ozone?

Communities can implement policies designed to reduce vehicle miles travelled, such as improved pedestrian and bicycle paths, improved public transportation, streamlined traffic signal-

ing, and infill and brownfield development. Communities can also prohibit open burning, especially during ozone season. In addition to these strategies, it’s important to encourage personal responsibility among citizens to reduce emissions of VOCs and NOx—thus reducing the amount of ozone that can form from these precursors.

Can your personal actions really make a difference when it comes to reducing ozone pollution? The answer is YES! Simple strategies like those listed below really add up:

- **Conserve energy**—at home, at work, everywhere. Reducing electricity use cuts down on fossil fuel emissions.
- **Refuel your car in the evening** when ozone is less likely to form from gasoline vapors. Be careful not to spill fuel and tighten your gas cap securely.
- **Mow in the evening.** Small, gas-powered engines like lawn mowers and other garden equipment emit high levels of ozone-forming NOx and VOCs. Mowing in the evening—when the sun is low and temperatures are cooler—means these emissions are less likely to contribute to ozone formation.

Continued on Page 12

Ozone: good or bad?

Ozone is a colorless gas composed of three atoms of oxygen. It occurs both in the Earth’s upper atmosphere and at ground level. When many of us hear the word *ozone*, we think of the protective layer of the Earth’s upper atmosphere, which shields us from the sun’s ultraviolet rays. This “good” ozone is different from the ground-level ozone that can pollute our air. In a sense, you could say that ozone is “good up high, but bad nearby.”

The Earth’s ozone layer is located in the upper stratosphere, between six and 25 miles up. For the last 50 years or so, this “good” ozone has been under attack by chlorofluorocarbons (CFCs) and other manufactured compounds. These substances have been used in coolants, solvents, foaming agents, pesticides and aerosol propellants. Once released, CFCs persist for years as they move through the troposphere and stratosphere. In the stratosphere, CFCs break down and release chlorine and bromine molecules, which destroy the “good” ozone. Countries around the world have agreed to phase out the use of CFCs and other ozone-depleting chemicals, though their effects will continue to persist for decades.

There’s nothing good about ground-level ozone. This pollutant can present a serious air quality problem for healthy people and can cause severe problems for people with respiratory or pulmonary illnesses, the very young and the elderly. Ground-level ozone also injures plants (including crops), and long-term exposure can even damage property and monuments.

Setting a 'green' example in Woodford County

By Johnna McHugh
Division of Conservation



project. It was able to secure \$10,000 in funding from the Woodford County Fiscal Court and an additional \$6,200 from other funding sources. Because the Woodford County Conservation District is a county agency, the board wanted to ensure the use of Woodford County materials and labor, if at all possible.

After the bidding process, Christian Electric (a local electrician) and Kentucky Lighting (a local supplier) began using Sylvania products, some of which were manufactured in Woodford County. Occupancy sensors and timers were installed throughout the building to ensure rooms that are empty will have lights that turn off automatically. Electricity use was decreased simply by switching to more energy-efficient lamps. Fewer lamps were also used; four-lamp fixtures were replaced with two- and three-lamp fixtures.

The Woodford County Conservation District recently completed Phase I of its “Going Green” project. The district owns and operates the Agricultural Resource Building in Versailles, which houses the conservation district as well as the Farm Service Agency and Cooperative Extension Service. During the past 15 years since the building opened, the electric bills have almost doubled. As a way to set a good example for the local community, the district board decided to make the building more energy efficient, which would ultimately save the district money.

“We hope to show our community that you can go green in small ways every day,” said Harold Carmickle, chairman of the Woodford County Conservation District. “That’s what the conservation districts are all about—preserving the Earth’s resources however we can.”

The process began in 2007 when the board’s educational outreach committee held preliminary discussions about the going green project. Following an audit conducted by Kentucky Utilities, the board began looking for funding to pay for the



TOP: Randy Christian (left) and Daniel Owens, both of Christian Electric Plus, install energy-efficient florescent lightbulbs in the Agricultural Resource Building.

ABOVE: (left to right) Woodford County Conservation District supervisors Peggy Carter Seal and Harold Carmickle discuss changes to the building with Martha Newby, Randy Blackburn, Randy Christian and Lillie Cox. Photos courtesy of The Woodford Sun

Randy Blackburn, Frankfort branch manager of Kentucky Lighting, estimates that it will take seven to eight years for the district to recoup its investment. The board hopes to save \$1,600 annually on its electric bills due to reduced usage, and an additional 25 percent savings from the occupancy sensors. Additional one-time savings will be realized from product rebates.

Future energy efficiency measures are being considered including installing insulation in the underground rooms, purchasing energy-efficient appliances and separating office space.

FIELD DUTY

Continued from Page 8



Delius (left) and John Thompson of Creech Services discuss the company's waste disposal plans for Fayette County. Photo by Allison Fleck

DOW programs," she said. "That includes water quality certification, drinking water and wastewater plants, best management practices, grant opportunities, wetlands, dams and floodplains – just about everything factors in at some point or another. You can't know everything, but you can always call the main DOW office in Frankfort for clarification."

The last stop of the day is in Versailles. Just past the airport, near a gas station/restaurant, is a fenced structure in the corner of a parking lot. It gave off a loud noise and a rather unpleasant odor.

"This," said Delius pointing, "is a wastewater package plant."

She obtains the key from the store manager, opens the lock and, without hesitation, proceeds inside.

"This is pretty bad, plus something smells dead," she remarks as she inspects the facility. "This one is going to be a violation. Watch your step – you don't want to know what you're standing on."

"You got to come out when the sun was shining," she said. "We go out in every kind of weather. Talk about muddy boots."

I looked down at my own boots. No mud, but they weren't going to make it past my front door. Not after where we'd been. Maybe I should have taken Delius up on those Wal-Mart bags after all.

Duties of an Environmental Inspector

- Inspect public water supplies, wastewater facilities, oil and gas facilities for state and federal regulatory compliance.
- Inspect nonpoint source pollution associated with agricultural, silvicultural and storm water activities for regulatory compliance.
- Investigate citizen complaints related to drinking water, wastewater, floodplain, groundwater and pertinent environmental issues.
- Conduct site surveys for construction of proposed wastewater treatment systems and agricultural waste lagoons.
- Prepare inspection reports and enter information into database.
- Collect samples and field data.
- Respond to bypasses, spills and environmental emergencies.
- Operate and maintain equipment.
- Make presentations to schools and civic groups.

Blasting: a citizens' guide

Continued from Page 4

to ensure that all explosives are accounted for, making it difficult to falsify reports. When an inspector documents a violation, a citation and/or a notice of noncompliance is written to the blaster and/or the company performing the work. Liability insurance is required for all blasting operations in Kentucky, and monetary settlements are a civil matter.

Q: What can a citizen do if they feel that a blasting operation is not operating in compliance?

A: The Explosives and Blasting Branch is responsible for investigating any blasting damage allegation. Citizens should call the Frankfort Office at 502-564-2340 to request an investigation or report questionable behavior by the users of explosives.

Additional information regarding blasting laws and regulations and technical reports can be found at <http://www.dmre.ky.gov/eandb/> and <http://www.arblast.osmre.gov/>.

THIS OZONE SEASON: TAKE ACTION

Continued from Page 10

- **Carpool, use public transportation, bike or walk whenever possible.** Motor vehicle emissions make up more than half the national emissions of NO_x and nearly half of VOCs.
- **Limit engine idling.** Did you know that leaving your car idling longer than 30 seconds uses more energy and produces more wear and tear on your engine than turning the engine off and restarting it? Drive-through lanes, railroad crossings and school pick-up/drop-off areas are all great places to limit idling.
- **Keep engines tuned up** according to manufacturer specifications.
- **Use environmentally safe paints and cleaning products.** Many of these products are made with smog-forming chemicals that can evaporate. Follow manufacturer recommendations for use, and properly seal cleaners, paints and other chemicals to prevent evaporation.
- **Avoid open burning.** Burning trash (except for uncoated paper products) is always illegal in Kentucky. Burning yard waste like tree limbs, while legal in most areas, produces NO_x and can contribute to ozone formation. Consider alternatives like chipping, shredding and composting.



BACKGROUND: *Steam rises from an animal composting pile.*
BELOW: *(left to right) Department for Natural Resources Deputy Commissioner Larry Arnett, Division of Conservation Director Steve Coleman and Dr. Steve Higgins with the University of Kentucky stand next to a compost pile that is considered a safe and cost-effective way to dispose of dead animals.*
 Photo by Amanda Gumbert, UK/DNR

Dead animal dilemma

By Kimberly Richardson
 Division of Conservation

Thousands of Kentucky's livestock producers have serious decisions to make each day. Which crops should I put out next year? What will I do if we experience a drought this summer? What should I do with this animal that has just died? Luckily, that particular farmer has many options across the state thanks in part to conservation districts, fiscal courts, county agriculture development boards and local Farm Bureau boards.

For many years, the Soil and Water Conservation Commission has distributed environmental grants to conservation districts to help with dead animal removal. This money helps provide a service to the livestock producer as well as protecting our precious water resources. Last year, the Soil and Water Quality Cost Share Program, funded by Tobacco Settlement Funds and funds from the Kentucky Department of Agriculture, paid \$228,000 to 46 conservation districts to assist with the disposal of dead farm animals.

Animals can be disposed of in several different ways. For many, a contract is established with a rendering company to pick up the dead animals from the farm. However, the Food and Drug Administration issued new regulations on how these animals were to be handled by the rendering company. Now, several substances are prohibited from use in animal food and feed, resulting in livestock producers having limited options of a safe, effective way of disposal. For the rendering companies, the process has become substantially more expensive, and many companies have closed or increased their prices for dead animal removal.

To help livestock producers deal with this dilemma, the Governor's Office of Agriculture Policy (GOAP) partnered with the Kentucky Division of Conservation to create the Deceased Farm Animal Disposal Assistance program. Started July 1, 2009, this program offers funding to provide counties with ample time to deal with the disposal of dead animals. It allows conservation districts, county governments, extension councils and other groups



to apply for funding to administer a dead animal program that is environmentally safe and cost effective. To date, 32 conservation districts, fiscal courts and county farm bureaus have received more than \$165,000 to administer a dead animal removal program.

Across the state, groups are banding together to find ways of helping landowners comply with their Agriculture Water Quality Plan by safely disposing of their dead livestock. Elliott and Morgan counties have created a program utilizing funds from environmental grants. Franklin, Lincoln, Madison and Nelson counties have partnered with their county road departments for animal pickup and disposal in area landfills where they are buried according to state law. Boyle, Taylor, Henry and Shelby counties partnered with their fiscal courts to share animal removal expenses. Garrard County Conservation District uses the funding they receive to dedicate an operator and equipment to dispose of the animals on farms according to state veterinarian requirements.

The University of Kentucky continues to research the composting of dead animals (see *Dead animal composting research yields startling results* in the winter 2010 issue). Composting is a safe, cost-effective way to dispose of dead carcasses. The Division of Conservation is working to develop a new practice standard that will be included in the Soil and Water Quality Cost Share Program to encourage farmers to utilize this method of animal disposal and receive financial assistance.

Frankfort citizens sketch visions of their community's future

By Amanda LeFevre
Division of Compliance Assistance

Residents of Frankfort had the unique opportunity to express some ideas for their town with its leaders. The group attended a visioning session at Memorial Baptist Church in the Holmes Street corridor, which was part of a brownfield assessment grant used to determine future uses of potentially contaminated properties in the area. Though the general focus was on the Holmes Street corridor, participants were asked to consider the entire community in their drawings.

The Vision-to-Action process, which has been popular throughout the south and is spreading to other regions, involves citizens in a community talking and brainstorming about what they would like to see happen in their town and then drawing those visions. An artist looks at all of the sketches submitted and creates a combined vision on paper.

“Through the visioning process, the community takes ownership of the redevelopment plan,” says Herb Petitjean, Kentucky Brownfield Program coordinator. “There is great power in that ownership—a power that will outlast changes in city officials and fluctuations in the economy to see the project through to eventual completion.”

After a brief orientation explaining the Vision-to-Action process, attendees were provided with markers, crayons and paper to sketch their vision for Frankfort and the Holmes Street corridor. When the drawings were complete, all participants were encouraged to talk about their visions.



ABOVE: An artist's rendering of Frankfort's riverfront based on visions from the city's residents.



LEFT: Residents discuss their sketches and share ideas for the Holmes Street corridor. Photos by Division of Compliance Assistance

Each sketch was then scanned into a computer and printed into a miniature 3-inch by 2-inch version. These were added to other stock sketches of community activities, people and places that included park scenes, farmer's markets and outdoor activities, among others.

Next, participants glued their original drawings along with the miniature versions onto a blank poster, which helped bring the various versions to life. During this portion of the process, participants often used the drawings of other community members to magnify their own vision, therefore connecting the ideas that are shared with the entire group. AMEC Earth and Environmental and landscape architect Josh DeSpain, of Ross Tarrant Inc., sketched the commonalities of the visions and created preliminary sketches for the

community. These were finalized into a completed vision packet with professional renderings of the ideas.

After producing a shared vision, attendees discussed available resources and financial aid that would help them achieve their visions. The professional renderings will be used as a marketing, communication and educational tool to help move their community to action.

The Kentucky Brownfield Program exists to help communities, nonprofits and prospective purchasers with their brownfield projects. Staff offer a variety of services to those who are interested in turning problem properties into economic and community development opportunities. For more information, visit <http://www.dca.ky.gov/brownfields/> or call 800-926-8111.

Earth Day celebrates 40 years

Gov. Steve Beshear proclaimed April 16-22 as Earth Week in Kentucky, and this year marked its 40 anniversary. To commemorate the annual worldwide event, Energy and Environment Cabinet employees visited local schools and festivals to help Kentuckians learn how to become better stewards of the Earth.



Jill Hunter of the Underground Storage Tank Branch in the Division of Waste Management participated in an Earth Day event at Red Orchard Park in Shelbyville, Ky. Visitors to the display observed a worm compost bin, recycled paper bead jewelry and discussed the benefits of using nonhazardous cleaning supplies. DWM photo



Where's the exhaust? Students from Garth Elementary search the tailpipe of Division for Air Quality's Toyota Prius for the exhaust while the car is idling. DAQ photo



EQC Earth Day Awards

The Kentucky Environmental Quality Commission celebrated the 40th anniversary of Earth Day with its annual awards ceremony at Berry Hill Mansion in Frankfort.

"These Earth Day awards serve to educate Kentucky's citizens about the value of environmental stewardship," said Energy and Environment Cabinet Deputy Secretary Hank List. "This year's selections are diverse and show us how each one of us can have a positive impact on protecting the environment and influencing others to do the same."

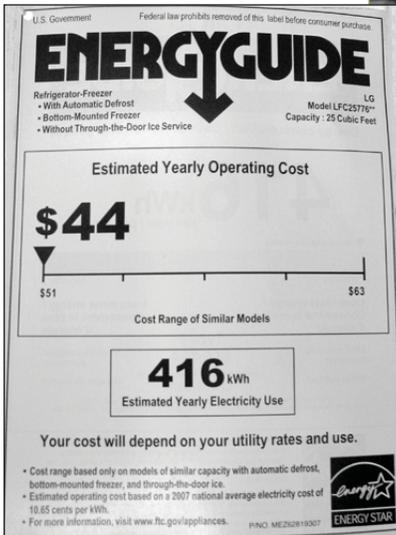
The 2010 Earth Day Award recipients were:

- **Campbell County Conservation District**—for its efforts to promote agricultural land conservation by conducting a "Cost of Community Services" study.
- **Christopher Gray Sr.**—for turning Marvel Golf Club near Benton, Ky., into the most environmentally responsible golf facility in the state.
- **Mill Creek Restoration Team**—a group of professionals that are restoring Mill Creek in Fayette County. The results of their work allow for professional development activities for teachers, field days for students and a restored stream for the public.
- **Millie and Frank Anderson**—for utilizing best management practices on their 125-acre farm in Scott County.
- **Save Kentucky's Hemlocks**—a partnership of citizens, nonprofits and government agencies working together to save eastern hemlocks from the impacts of Hemlock Woolly Adelgid. To date, more than 15,000 trees have been treated in some of Kentucky's most pristine hemlock forests.
- **Bernheim Arboretum and Research Forest**—for building ecology and sustainability into its educational offerings that are available throughout the year.
- **A.L. Sinclair**—of Adair County works tirelessly to improve his community's environment through recycling and roadside cleanup initiatives.
- **Sandy Whitaker**—of the Rockcastle County Conservation District has been called 'the main force' behind the district's accomplishments.
- **Lifetime Achievement Award**—**Mary Dickey**—solid waste coordinator for Boone County.
- **Public Service Award**—**Karen Reagor**—state coordinator of the Kentucky NEED (National Energy Education Development) project.



Ella Lemley-Fry (left) and Jenny Howard, with the Kentucky Division of Water, talk about nonpoint source pollution while using the Enviroscope, an interactive display, at the Green Expo held at the State Office Building in Frankfort. DAQ photo

Gov. Steve Beshear announced the \$4 million appliance rebate at a kickoff event at Rabon's TV and Appliance in Paris, Ky. Consumers applied for the rebates to replace their old, energy-inefficient appliances with new Energy Star models. Photos by Creative Services and Cindy Schafer



Kentuckians answer call to purchase energy-efficient appliances

By Brooke Smith
 Department for Energy Development and Independence

On April 22, Gov. Steve Beshear announced the kickoff of Kentucky's Energy Efficient Appliance Rebate Program. Thanks to the American Recovery and Reinvestment Act, the U.S. Department of Energy awarded the state \$4 million to help Kentuckians replace old, energy-inefficient appliances with new ENERGY STAR qualified models.

By May 21, one month after the kickoff, all funds had been reserved and a rebate waiting list was established. Nearly 34,000 Kentuckians seized the opportunity to take steps in making their home more energy efficient. Pending availability of funds, residents may be placed on the waiting list. Information may be found at www.KYappliance rebates.com or by calling toll free 877-813-3669.

The success of the appliance rebate program is proof that Kentuckians have the desire to make their homes more efficient for the benefit of the environment and their wallets. Installing new appliances, replacing old, drafty windows and adding insulation are a few methods of creating a more comfortable home. However, to truly achieve maximum energy efficiency, greater comfort and lower utility bills, the best results come from a

comprehensive, whole-house approach. Taking cues from Home Performance with ENERGY STAR, and the upcoming program Kentucky Home Performance (KHP), homeowners can make small-to-moderate investments in their homes that actually result in savings each month on their utility bills.

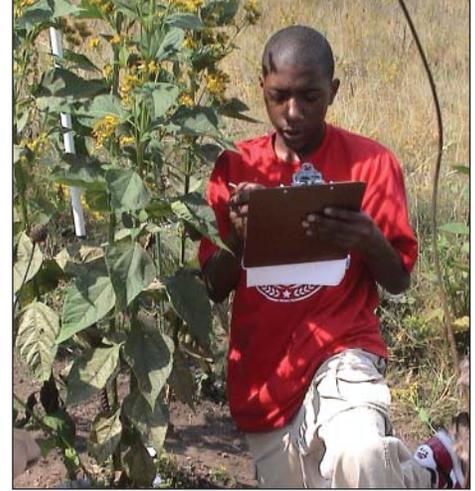
KHP, administered by the Kentucky Housing Corporation, will launch on July 22 and leverage an estimated \$17.5 million in private capital and funding to help homeowners make their homes more energy efficient. The program was initiated by the Kentucky Department for Energy Development and Independence and the Finance and Administration Cabinet.

The benefits of KHP include savings of as much as 20 percent or more on utility bills, fewer drafts and more comfortable rooms, as well as work performed by specially trained contractors and third-party quality assurance. KHP is responsible for ensuring that participating contractors maintain high standards for quality. This typically includes specialized training and quality assurance inspections. Since the up-front cost is often an impediment, the program will also offer the homeowner

a low-interest loan. Alternatively, if a homeowner has the cash or does not have an adequate credit score, the homeowner may apply for a rebate towards the home improvements. For more information on KHP, visit www.KYHomePerformance.org or call 800-633-8896.

Home Performance with ENERGY STAR, a national program from the U.S. Environmental Protection Agency and the U.S. Department of Energy, offers a comprehensive, whole-house approach to improving energy efficiency and comfort at home, while helping to protect the environment by reducing carbon emissions. Specially trained contractors participating in the program evaluate homes using state-of-the-art equipment and recommend comprehensive improvements that will yield the best energy-savings results. Rather than focusing on a single component, such as single-pane windows, an old air conditioning system or leaky ductwork, a participating contractor will assess how improvements to all of these components can work together to gain maximum energy efficiency.

For more information on energy efficiency programs available to Kentuckians, visit www.energy.ky.gov or call 502-564-7192.



LEFT: Students from Cullowhee Valley Elementary in North Carolina collect data in the ozone biomonitoring garden at the Appalachian Highlands Science Learning Center in Great Smoky Mountains National Park. **TOP:** A student from Asheville High (N.C.) collects data. **BELOW:** This photo shows ozone damage on a cut-leaf coneflower leaf. Photos by Susan Sachs, National Park Service

Monitoring ozone with plants

By Roberta Burnes
Division for Air Quality

Like humans, plants can be injured by ground-level ozone pollution—and the effects add up over time. Plants are actually *more* sensitive to ozone exposure than animals because so much of their surface area is used in respiration. When a plant respire, carbon dioxide—and anything else in the air like ozone—is taken into the plant’s cells through its leaves. Ozone can impede a plant’s ability to photosynthesize, weaken cell membranes, and slow growth and production of fruits and seeds. By the end of the growing season, plants exposed to moderate levels of ozone show numerous symptoms including stippled, discolored leaves, stunted growth and premature leaf dropping.

Some plant species are so sensitive to ozone that scientists use them as bioindicators to monitor the health of an ecosystem. Kentucky has several native species that are sensitive to ozone including black cherry (*Prunus serotina*), tulip poplar (*Liriodendron tulipifera*), sassafras (*Sassafras albidum*), spreading dogbane (*Apocynum androsaemifolium*), and milkweed species (*Asclepias spp.*). Sensitive agricultural crops include potato, alfalfa and certain cultivars of corn. Like a canary in a coalmine, bioindicators can give us clues about the presence and effects of pollution in our environment.

In 1994, the USDA Forest Service implemented a national ozone biomonitoring program using ozone-sensitive plants to

monitor air quality and assess the impact of ozone stress in natural systems.

In Kentucky, two dozen biomonitoring sites scattered across the state are sampled annually for foliar injury. Ozone injury in plants adds up over time, so test plots containing sensitive species are examined in late summer when the effects are most likely to be visible. The symptoms first appear as purplish spots on a leaf’s upper surface. Continued ozone exposure can lead to yellowing of the leaves, and eventually leaves may drop off altogether or the plant itself may die. Scientists can correlate plant damage in test plots with measured ozone levels in the vicinity to help understand short-term and long-term effects of ozone on sensitive ecosystems.

Interestingly enough, plants tend to exhibit fewer symptoms of ozone injury during periods of prolonged drought—even when ozone levels have been high. Plants have a survival mechanism to help them cope with drought stress: they close their *stomata*, the tiny openings that permit gas exchange. This not only helps to prevent water loss but also prevents the plant from taking in ozone from the air.

How do we know these symptoms are caused by ground-level ozone, and not something else in the environment or the plant’s genetic makeup? In 1988, researchers in the Great Smoky Mountains National Park set up test chambers—enclosed “mini-greenhouses”—containing



more than 100 species of plants. Each chamber had a specific concentration of ozone pumped into it. Responses of the plants in each chamber were quantified and recorded. As a result of the study, 30 species of plants were classified as highly sensitive to ozone, and another 60 species showed some effects when exposed to high levels of ozone.

Today, middle and high school students continue where this original study left off, monitoring study plots in the Great Smoky Mountains National Park for signs of ozone stress. Students are trained in a basic protocol for identifying visible leaf injury on two species—cutleaf coneflower (*Rudbeckia laciniata*) and crownbeard (*Verbesina occidentalis*). By helping researchers collect valuable data, these young people have become citizen scientists, gaining real-world experience and developing a better understanding of how ozone affects the health of plants and people.

Continued on Page 19



LEFT: Students learn basics of air operations during training at the academy.

BELOW: Entrance to the Tennessee Fire Service and Codes Enforcement Academy. KDF photos



KDF firefighters attend Interagency Wildland Fire Training Academy

By Lynn Brammer True
Division of Forestry

Earlier this year, the Kentucky Division of Forestry (KDF) collaborated with other state and federal resource agencies to sponsor the eighth annual Tennessee-Kentucky Wildland Fire Academy.

Nearly 400 students, including 110 from Kentucky, and more than 70 instructors attended the academy in Bell Buckle, Tenn., to advance their knowledge and skills in wildland fire suppression, prescribed fire and the Incident Command System (ICS).

The week-long academy offered 23 training courses ranging from basic wildland firefighting skills and air operations to courses for fire line supervisors and incident commanders.

KDF's wildland firefighters, also known as forest ranger-technicians and foresters, are professionally trained to National Wildfire Coordinating Group (NWCG) standards. Although newly hired employees receive basic training in firefighting operations with particular emphasis for safety and survival, firefighting techniques, fire behavior, weather, and use and care of firefighting equipment, the academy offers KDF's firefighters the opportunity to advance their skills through field exercises, lectures and training from instructors with many years of wildland fire experience.

The academy also operates under the Incident Command System promoted by NWCG for the purpose of simulating the operational organization of a wildland fire response incident. This allows firefighters to become familiar with ICS and assist them with future deployments.

"The academy allows our firefighters to work and train with other agencies in an effort to make wildland fire response efforts safer and more efficient," said Bernie Andersen, fire management chief for the Kentucky Division of Forestry. "We send as many students and instructors as possible to the academy each year."

Beginning this year, the academy will donate \$250 annually to three memorial foundations—the National Fallen Firefighters Foundation, the Tennessee Fallen Firefighters Foundation and the Kentucky Fallen Firefighters Foundation.



Sponsoring Agencies

- Tennessee Division of Forestry
- Daniel Boone National Forest
- Cherokee National Forest
- Big South Fork National River and Recreation Area
- Land Between the Lakes National Recreation Area
- Fish and Wildlife Service Southern Region

Awards

Morris receives Outstanding Service Forester Award

By Lynn Brammer True
Division of Forestry

Kentucky Division of Forestry (KDF) employee James Morris recently received the Outstanding Service Forester Award from the Kentucky Woodland Owners Association (KWOA). Morris, who works in the Green River District, has advanced forest management through his work with private landowners since 1995. He was selected by KWOA as the first recipient of the annual award based on his accomplishments over the past few years.

Since 2007, Morris has provided technical assistance to approximately 180 woodland owners, prepared 112 forest stewardship plans, and inspected nine American Tree Farms for certification. As a service forester, he primarily works with private landowners who manage their woodlands using sustainable forestry practices. Morris' responsibilities also include marking timber for harvest and timber stand improvement, planting seedlings,

KWOA Vice President Henry Duncan presents James Morris with the Outstanding Service Forester Award. KDF photo



conducting forestry education programs and fighting forest fires.

“James is highly respected and appreciated by landowners throughout the Green River District,” said Henry Duncan, KWOA vice president. “His knowledge of woodland management and cost-share programs has enabled landowners to better manage their woods for timber, wildlife habitat, watersheds and outdoor recreation.”

Morris serves Christian, Logan, Todd and Webster counties, and despite a demanding workload makes time to work cooperatively with other resource agencies

including conservation districts, county extension offices, Department of Fish and Wildlife Resources, Natural Resource Conservation Services and Farm Services Agency.

KDF is fortunate to have the dedication, experience and leadership of employees like Morris who provide an invaluable service to landowners and who play an important role in protecting the health of our forest lands.

For more information about KWOA, visit <http://kwoa.net/index.htm>.

Monitoring ozone with plants

Continued from Page 17

Biomonitoring data alone cannot give a complete picture of ecosystem health nor of air quality. Nevertheless, when combined with environmental, genetic and climatic data, biomonitoring provides valuable data for understanding how plants—from forests to farm crops—respond to ground-level ozone.

For more information on ozone biomonitoring, citizen science and sample lesson plans, visit *Using Citizen Scientists to Measure the Effects of Ozone Damage on Native Wildflowers* at <http://www.nsta.org/middleschool/>; milkweed biomonitoring activity for students at <http://dnr.wi.gov/org/caer/ce/ee/teacher/milkweed.htm>; and biomonitoring in the Great Smoky Mountains National Park: http://handsontheland.org/monitoring/projects/ozone/bio_mon.cfm

Maxey Flats Project Background

Continued from Page 6

an Interim Maintenance Period (IMP) to monitor the effectiveness of those remedial activities. The IMP defines the majority of the current maintenance and operation activities that occur at MFP, including the annual cap inspection.

The Commonwealth ceased usage of contractors to manage maintenance and stabilization efforts in 1992. The responsibility was then placed on the Superfund Branch and the Maxey Flats Section (MFS) was established. The MFS is responsible for all facility operations, maintenance and environmental monitoring activities. Two onsite laboratories are operated to conduct radiological analysis on more than 3,500 samples annually. The MFS also provides its own resources for construction, excavation and countless other activities.

Froelich recognized for his work with tree farmers

By Lynn Brammer True
Division of Forestry

Michael Froelich was recently honored as the 2009 Kentucky Tree Farm Inspector of the Year at the Kentucky Forest Industries Association (KFIA) 45th annual meeting in Bowling Green. Froelich is a service forester for the Kentucky Division of Forestry and has helped advance forest management through his work with private landowners and the Kentucky Tree Farm Program since 2007.



Kentucky Tree Farm Committee Chair Robert L. Volk (left) presents Michael Froelich, Kentucky Division of Forestry service forester, with the Inspector of the Year award.

Photo by KDF

Froelich, who works in the Southeastern District, completed five new tree farm inspections and recertified two tree farms last year earning him recognition from the Kentucky Tree Farm Committee. He conducted the inspections to ensure that sustainable forestry practices were being implemented by the landowners and to determine certification status for each farm.

In order to become a certified Tree Farm and maintain certification, landowners must implement a management plan based on strict environmental standards and pass an initial inspection and subsequent inspections every five years.

Kentucky has more than 800 certified tree farms owned by private landowners who manage their forests for a wide range of environmental, economic and social benefits. Tree farmers share a unique commitment to protect wildlife habitat and watersheds soil, provide recreation for their communities while producing wood for America. These individuals hold the key to sustaining our forests.

The Kentucky Tree Farm Committee is sponsored by the KFIA, a statewide association promoting the forest products industry of Kentucky since 1965, and the Kentucky Division of Forestry and is part of the American Tree Farm System promoting sound forest management through sustainable forestry.

For more information about the program or how to become a certified tree farmer, contact Bob Bauer at 502-695-3979 or Pam Snyder at 502-564-4496. More information is also available online at <http://www.kytreefarm.org/> or <http://www.forestry.ky.gov/programs/stewardship/American+Tree+Farm+System.htm>.

Mine rescue teams hone skills in emergency drill

Continued from Page 1

crucial. Each team member is attached to a “lifeline” that spaces the six-man team within arms reach of each other.

Throughout the exercise, teams effectively deal with each situation presented—from attending to two patients and their injuries to recovering two simulated fatalities, while maintaining constant communication with the command center. Impartial judges score each team on their performance, giving markdowns for mistakes that could cost the life of a team member or a trapped miner.

“I am very pleased with our mine rescue teams and their continued efforts to sharpen their skills,” said Johnny Greene, executive director of the Office of Mine Safety and Licensing. “Our goal is to remain vigilant and always ready to react when coal miners are missing and to provide rescue services to Kentucky’s coal industry.”

At the end of the two-day exercise, team leaders were satisfied that their members had improved their rescue skills. The importance of this training is validated each time a team is called upon to assist in an actual emergency.

“I commend these men on their rescue skills and commitment to mine safety,” added Carl Campbell, commissioner of the Department for Natural Resources. “Our continued goal is that Kentucky’s mines are as safe as possible for the miners who depend on them for their livelihood. These rescue teams are crucial in saving lives when accidents do occur.”

The winning mine rescue team for both days of competition was Madisonville District Blue.



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Seedling nurseries: growing trees for healthy and productive forests

By Lynn Brammer True
 Division of Forestry



One of the most important services provided by the Kentucky Division of Forestry (KDF) is growing and planting native tree seedlings. Over 50 different species of conifers and hardwoods are available for public and private restoration projects such as improving wildlife habitat, restoring stream-sides, establishing plantations

and landscaping backyards. Orders are taken from late summer through spring, and deliveries are made from January through April each year.

Although seedling sales will not occur again until late summer, availability can be competitive, so now is the time to research and decide on the best species to suit your next project. For more information about the state nurseries and to obtain a seedling order form, visit www.forestry.ky.gov or contact KDF at 1-800-866-0555.

The featured tree seedling for this issue is silky dogwood—one of three dogwood species grown at KDF’s state nurseries.

Silky dogwood is a large, deciduous shrub reaching 6 feet to 10 feet in height. It grows best in moist, poorly drained soils and is an excellent selection for planting along streams. Other beneficial uses are for fish and wildlife habitat improvement, slope stabilization, field windbreaks and as an ornamental.

Just the Facts: Silky Dogwood (Cornus amomum Mill.)

- **Growth:** The growth habit is upright and rounded and can reach 10 feet in height. Roots typically form where stems are in contact with the ground, thereby creating thickets.
- **Sites:** The vigorous growth of Silky Dogwood is optimized in moist to wet sites, but adapts well to dry soil conditions in fields and fencerows. It prefers full sun to partial shade.
- **Range:** Silky Dogwood is native to the eastern United States from Michigan south to Florida. It grows throughout Kentucky in swamps, on stream banks and on dry slopes.
- **Human Uses:** The primary use of this species is for field and farmstead windbreaks, wildlife borders and streambank protection.
- **Wildlife Uses:** Blue fruit matures in summer and are quickly consumed by birds, squirrels and other woodland mammals.
- **Tree Trivia:** As a member of the Dogwood family, it is related to many other species of Dogwoods, and distantly related to Black Tupelo.

