Introduction

The fires that scorched the state during the winter months of 2005-2006 remind us of the natural cycle of our environment. New growth springs from burned fields and the cycle of life continues. Natural environmental processes also work to return polluted sites to their natural state. Wind and water erosion, solar and bacteriological degradation, fire, and plant absorption of chemicals can, over time, return contaminated land to a viable state. These natural processes do not usually occur in a timeframe acceptable to humans. Fortunately, people have learned to harness these natural processes to improve our stewardship of the land.

The Land Protection Division’s (LPD) mission is to promote land stewardship, ensuring that future generations at least reap the same benefits as the current generation. To do this, LPD must work to ensure that human activities and the wastes we produce are appropriately and responsibly managed and that historically polluted sites are restored. The division regulates disposal of solid waste, discarded tires, hazardous wastes, biomedical wastes and certain radiation sources. It also assists with household and commercial recycling programs, and provides the public with environmental education. Land Protection also specializes in cleanup and reuse of contaminated properties.

Protecting the land from improper waste disposal safeguards surface water, ground water and air from pollutants. LPD’s efforts strengthen the natural environment by protecting our ecosystems. LPD also ensures that Oklahoma’s land remains viable and productive for future generations by reducing the human impact on the environment.
DEQ recently completed the first year’s work on sampling and analysis of water quality and sediments in Tar Creek, Spring River and Neosho River, in northeast Oklahoma. The 2-year study is being conducted in cooperation with the U.S. Geological Survey (U.S.G.S.) and the Seneca-Cayuga Tribe. The collection of low- and high-flow water quality and sediment samples is a monumental step toward establishing the baseline for measuring metals entering these waters. Tar Creek was the subject of the first-year sampling report. The data collected are helping to characterize water and sediment quality and to evaluate movement of total and dissolved metals in the creek, which flows into the Neosho River and Grand Lake O’ the Cherokees.

Trends are beginning to appear in the initial data. The areas along Tar Creek at Douthat Bridge and Highway 69 are showing higher lead and zinc concentration during high flow periods than detected at other sites. The data also show that iron is settling into the creek’s sediment, particularly between Veterans Boulevard and Central Street in Miami, Oklahoma. In addition to water quality and sediment data, U.S.G.S. collected 14 sediment cores using a Geoprobe in the floodplain where Tar Creek intersects the 22nd Street Bridge in Miami. All core samples had detectable concentrations of aluminum, barium, chromium, copper, iron, lead, magnesium, manganese, nickel and zinc. A second year of sampling and analysis results also have been sent to EPA for approval.

Continued on next page

May 2004, Estimated Contaminant Loading for Selected Parameters

Above: Contaminant loading at sites along Tar Creek.

Left: Metals in Tar Creek.
When complete, this project will concentrate clean-up efforts at the areas with the highest levels of metals. It also will help determine how much of the metals contribution is from Tar Creek in Oklahoma and how much is from upstream states. Using the baseline data and working with other agencies and neighboring states, we may be able to begin reducing the concentration of metals and improving the quality of the water that is entering Grand Lake O’ the Cherokees.

DEQ Data Viewer Focuses on Tar Creek

The capability of the Web-based GIS application, the DEQ Data Viewer, continues to grow. The Data Viewer organizes and presents information graphically to give planners a better understanding of multi-dimensional data. DEQ recently added high-resolution (1/4 foot resolution) aerial photography, significantly enhancing the visual tool.

The application is also known as the Tar Creek Data Viewer, since it was originally developed to support restoration activities at the Tar Creek Superfund site, where state, federal, tribal and private organizations are working together on various remediation, restoration and evaluation projects. For the Tar Creek project, the Data Viewer uses data specific to area activities that span three-quarters of a century, from 1927 to the present, including historic mine maps and aerial photography. Photos accompanying this article reflect before-and-after images of an area near Picher that was recently restored as part of a joint effort among various state agencies.
Land Protection

Tar Creek Superfund Site Located in Ottawa County, Oklahoma

The Tar Creek Superfund site spreads across 40 square miles in far northeastern Oklahoma, affecting the towns of Quapaw, Commerce, Picher, North Miami and Cardin. The site is part of the former Tri-State Mining Area that extended from northeastern Oklahoma through southeastern Kansas, and into southwest Missouri. Extensive lead and zinc mining from the early 1900s through the 1960s resulted in formation of acid mine water, contaminating shallow ground water and surface water with iron, sulfate, zinc, lead and cadmium. Approximately 40 million cubic yards of chat (gravel contaminated with lead and zinc) remain on the surface.

The unique Oklahoma Plan for Tar Creek has worked to shrink the Superfund site, thanks to cooperation among state, federal and local agencies. The following is an update of successful projects in the area.

Tar Creek: Asphalting of Roads

The Tar Creek Superfund Site contains miles of roads that for decades have had chat spread on them. With the cooperation of Ottawa County Commissioner John Clarke, approximately 15 miles have recently been paved with asphalt, significantly reducing dust levels from traffic. The new asphalt contains approximately 50 percent chat, a beneficial reuse of that material from the Superfund site. The roads were prioritized for attention by the county commissioner based on their traffic loads, considering general use by local citizens and haul roads used by large trucks.

Tar Creek: Governor Henry’s Voluntary Buyout

In 2004, enabled by state legislation, Governor Henry initiated a voluntary Buyout and Relocation Assistance Plan at Tar Creek. Area residents with children under six years of age were offered the buyout in order to remove them from potential exposure to lead from mine waste. In 2005, 51 qualifying families sold their properties and moved from the area. A local trust authority was designated to implement the buyout and DEQ disbursed the trust funds.

Tar Creek: Subsidence Risk

Following an 18-month evaluation of subsidence risk in the area of Picher, Oklahoma, the U.S. Army Corps of Engineers and a technical team presented their findings at a public meeting on

Continued on next page
On the left side of the aerial photo, the red and green holes (ponds) are clearly visible.

The road construction project gets underway with the construction of the road base.

Asphalt was applied to the roads to stop the migration of lead-contaminated dust.

January 31, 2006. Many area residences, businesses and roads that had been built above underground mine workings and abandoned mine shafts were declared to be at risk of collapse. Some were predicted to be more vulnerable than others.

In response, federal, state and local officials collaborated to develop a voluntary buyout program. The buyout was modeled on the Governor’s plan for Tar Creek implemented last year. The legislature amended that existing law to include the subsidence risks.

Officials now are seeking funding. When this and related issues are resolved, the program will prioritize offers for endangered properties directly over subsidence-prone areas, and then will extend the offers to those in under-mined areas.
The Imperial Refining Company is a 72-acre abandoned crude oil refinery. Located on both sides of State Highway 142 in northeast Ardmore, Carter County, the facility operated from 1917 to 1934, when it went bankrupt.

The refinery’s tanks and buildings were dismantled sometime between 1934 and 1948. Several pits, waste piles and water impoundments contaminated with heavy metals and refining wastes remain on the site. Wetlands in the southern part of the property have been affected by surface-water runoff from the waste. Along with EPA, DEQ is working on a Remedial Investigation and Feasibility Study to characterize and quantify the nature and extent of on-site contamination, determine ecological and human health risk, and develop and evaluate cleanup alternatives.

Field sampling of soil, ground water and sediment from on-site ponds was conducted from September 2005 through March 2006. The data gathered during the investigation will be compiled in a report that will be ready for public review in September 2006. The final report, due in December 2006, will help determine the best way to clean up the site.
The Tulsa Fuel and Manufacturing (TFM) Superfund site is located in Tulsa County, Oklahoma, approximately 1.3 miles south of Collinsville. Here, TFM operated a zinc smelter and lead roaster from 1914 through 1925. During World War I, zinc was in great demand for galvanizing armaments to prevent rust. The smelter operation used nine furnaces, a mechanical kiln building, a condenser room, a two-million gallon reservoir and a laboratory. Heavy metals are typical byproducts of such smelter operations.

EPA placed the TFM site on the Superfund National Priorities List on January 19, 1999. DEQ is conducting a remedial investigation of the property. The Phase 1 Report (sampling) will be completed by spring 2006. This report will include recommendations for additional sampling during Phase 2 of the investigation. Phase 2 sampling is scheduled to be completed by October 2006, and the Remedial Investigation and Feasibility Study (RI/FS) should be completed by December 2006.
Southeastern Oklahoma’s rich history intertwines with the logging and lumber industries. Historically, hazardous chemicals such as creosote, pentachlorophenol and copper arsenate were widely used to treat wood products to withstand weather and other environmental elements. The area’s former wood treatment sites have left a legacy of pollution for southeastern Oklahomans. Rab Valley is one of those sites.

Rab Valley is located southeast of Panama, Oklahoma, in LeFlore County. The 30-acre site was home to a wood treatment facility from about 1938 until it was abandoned in 1976. The facility was operated by different wood treatment companies during this period; the last was the Rab Valley Lumber Company. The company pressure-treated raw wood with pentachlorophenol and creosote-laden fluids. A system of lagoons (surface impoundments) was used to reclaim and reuse the preservatives not absorbed during each process.

Contamination is commonly found at old wood treating sites, especially ones that operated prior to environmental regulations. It was not surprising that a 1993 EPA investigation showed numerous contaminants in the site’s soil, sludge, surface water and ground water. A nearby wetland was also affected.

Joslyn Manufacturing Company, site operator from 1939 to 1955, and EPA entered into an Administrative Order on Consent in 1996 for site investigation and cleanup. DEQ works closely with EPA on the project and reviews all work that occurs on the site.

During the first phase of the cleanup, hazardous sludges from the impoundments were excavated, stabilized and transported for off-site disposal. Contaminated soil from the process areas was excavated, consolidated, treated and capped on site. In January 2006, additional cleanup aimed at reducing potential risk from direct contact with contamination began. The measures, completed within six weeks, included the excavation and consolidation of affected soils within and on either side of the southern drainage ditch leading to the wetland area; installation of an interceptor trench for collecting non-aqueous phase liquid seeping through the soil; construction of security fencing to restrict unauthorized access to the potentially affected lowland areas; and seeding of areas disturbed by field work to establish a vegetative cover. A Feasibility Study discussing proposed long-term cleanup options for the site will be submitted to EPA and DEQ for review and comment. Meanwhile, DEQ will continue to inspect the site quarterly.
New Life as Industrial Park for Henryetta Superfund Site

In the mid-1990s, two former Henryetta zinc smelters were cleaned up as part of an EPA Superfund Removal Action. When the cleanup was complete, the city began looking for businesses to occupy the newly named Shurden Leist Industrial Park. However, potential tenants remained skeptical about the site’s history of contamination, and for many years, the industrial park remained vacant.

In 2004, Henryetta’s city officials and development authority met with DEQ to discuss how the property might be reused, while addressing the concerns of future tenants and preserving the Superfund cleanup. DEQ staff suggested altering the original Superfund remedy to install clean utility corridors (see sidebar). DEQ also recommended contacting the U.S. Economic Development Administration about potential funding. These ideas proved sound.

To date, the City of Henryetta has acquired infrastructure funding for an industrial access road and utility lines for electricity, gas, water and sewer. DEQ has overseen removal of an area of capped waste and its replacement with clean fill, creating the clean corridor for the utility lines. Utility maintenance workers now have access to company lines without risk of exposure to contaminated materials. The wastes removed were reburied and properly capped elsewhere on the site.

With cooperation from several interested agencies, project designs and funding came together to ready the site for its first new tenant: ProStreet Framework, LLC, a manufacturer of aftermarket motorcycle frames for producers such as Honda and Harley Davidson, opened on May 22, 2006.

Clean Utility Corridors

Clean utility corridors can be installed when potentially contaminated properties are being prepared for safe industrial or commercial reuse. The idea is to ensure that no one mistakenly digs into a waste disposal area or is exposed to residual levels of contaminants that may have been left in place after a cleanup. Utility companies often must excavate lines for installation and repair; they want to ensure that their workers are not exposed to hazardous constituents in the process. This can be accomplished by removing contaminated media from the corridor(s) where sewer, water, electrical, fiber optic and gas lines are to be laid, replacing it with clean material. The measure allows utility workers to service the site safely without special training or protective equipment.

ProStreet Framework, LLC, prepares to build motorcycle frames as the first tenant on the site.
The mountains of waste that were left on site when the facility closed were cleaned up in the late 1990s.
Increased Controls for Radioactive Material Quantities of Concern

State and federal agencies that regulate radioactive materials are among those whose concerns peaked following the terrorist attacks of September 11, 2001. Although Hollywood renditions of terrorists actually building a nuclear weapon are unrealistic, some are concerned that an adversary might use “dirty bombs” to scatter fine radioactive materials over a wide area. A dirty bomb is a conventional explosive device, but with radiation sources such as those used in medical devices packed around the explosive, rather than shrapnel. Such a bomb would be unlikely to pose a life-threatening hazard outside the blast radius, but the potential psychological and economic effects could be tremendous.

In response to this kind of threat, the Radiation Management Section, Land Protection Division (LPD), is cooperating with the U.S. Nuclear Regulatory Commission (USNRC) and 33 other states to increase the security controls required for certain radioactive materials that companies may use in “quantities of concern.” USNRC and the Agreement States will require approximately ten percent of their licensees to institute increased controls when they possess large quantities of the radioactive
materials. Security and control are always significant factors in radiation protection, but now the new program requires licensees to implement additional security elements, providing an even higher level of protection to the nation.

Understanding and inspecting for adherence to security requirements is new for DEQ and for most of our licensees. To prepare, four DEQ staff members attended an 8-day course given by USNRC and Sandia National Laboratories. DEQ then held two day-long workshops for affected licensees and local law enforcement agencies in Oklahoma. The course helped attendees understand the new requirements and encouraged them to coordinate with one another. A total of 79 individuals attended.

DEQ will continue to help licensees implement the new measures. The agency soon will be inspecting for compliance. DEQ also continues to work with USNRC and other Agreement States to assure consistent nationwide application of the new requirements.

 Gamma Knife equipment is lifted into Mercy Hospital.

 Men continue to check for radiation leaks during installation of the Gamma Knife.
Industrial radiography is a form of nondestructive testing in which powerful radiation sources are used to detect flaws within even thick, dense objects. The testing is essential for analyzing welds in structures such as refinery pressure vessels, oil pipelines and aircraft parts. Tulsa is one of the major industrial radiography centers in the world.

Many years ago, state radiation programs, recognizing the need for trained and safety-conscious industrial radiographers, initiated state testing and certification procedures. In the late 1990s, the U.S. Nuclear Regulatory Commission (USNRC) adopted the states’ idea as a federal requirement. Now the test and certification programs must be approved by a committee of USNRC and state experts before they can issue certification cards.

To earn certification, Oklahoma radiographers must pass a computer-graded test on radiation safety. The test requires them to correctly perform exposure calculations, demonstrate knowledge of Oklahoma radiation safety rules, and demonstrate understanding of survey instrumentation and radiography equipment. Around the beginning of each year, DEQ announces its annual testing schedule. Five or six tests are typically given, rotating between test centers in Tulsa and Oklahoma City. Occasionally tests may be scheduled elsewhere if enough radiographers request testing at a location on a specific date. DEQ tests about 96 candidates each year; an average of 74 pass and receive certification cards.

Radiographers are required to have their certification cards with them whenever they work with radioactive materials. USNRC and state radiation programs recognize each other’s certification cards, critical in an industry in which workers routinely move around the country working at temporary job sites. A number of radiographers come to Oklahoma for testing through the DEQ program from states as far away as California, Wyoming and Florida, where testing isn’t available.

The DEQ radiation staff is proud that Oklahoma is one of only seven states approved to certify radiographers. As part of its commitment to radiation safety, DEQ will continue to provide this important service for a technology that is of great importance in Oklahoma.
New Oklahoma City residents are often surprised to learn that Bricktown – now a thriving, multi-use, downtown residential, retail and entertainment area – used to be an oil and gas field. In fact, the area has been active commercially and industrially throughout the state’s history. Oil and gas-related industries, railroad operations, manufacturing, warehousing and retail stores all have come and gone.

Over time, many of those activities contaminated the soil and ground water with gasoline and diesel fuel. During the past decade, however, the area has benefited from extensive soil and ground water investigation and soil remediation spurred by a public mandate to revitalize the area. In 1998, in its quest to redevelop and revitalize Bricktown, the Oklahoma City Urban Renewal Authority (OCURA) enrolled 21 acres of property in the Oklahoma Brownfields Program.

Upon completing the program in December 2005, OCURA received a Brownfield Certificate, clarifying the environmental issues attached to the property and

Continued on next page

Oklahoma City citizens voted to pay for improvements to Bricktown, such as the beautiful canal. The “build it and they will come” public investment philosophy enticed many private investors to the area.
limiting liability for new owners, tenants and lenders.

Bricktown continues to develop a new generation of mixed commercial and residential uses. The new Sonic corporate headquarters, several new restaurants, a multi-screen theatre, a combined retail-residential development, and the canal with its park and recreation areas all are part of Bricktown’s revival. Renewed business, residential and recreational opportunities in the area are creating hundreds of jobs and a vastly improved tax base. Tourism is growing as word spreads about Bricktown’s resources. The revitalization of Bricktown is shaping up to be a real Brownfields Program success story.
More than 90 Oklahoma communities are host to National Guard armory facilities. Recently, the federal Base Realignment and Closure (BRAC) Committee recommended replacing the majority of these historic facilities with Central Training Centers. The facilities would then revert to or be donated to the communities, depending on the nature of the original land transfer.

The towns are pleased to take ownership of these magnificent buildings, which hold a special place in the memories of most residents. Before the property transfer can occur, however, environmental issues connected with the armories must be resolved. DEQ is assisting the Oklahoma Military Department, the Department of Central Services and local communities with the task. In 2006 the legislature provided funding to help in this endeavor.

In general, the age of the buildings almost certainly means that they will contain problematic amounts of asbestos and lead paint, as well as PCB-containing light fixtures. The most complicated environmental problem, however, is a leftover from indoor firing ranges. These were equipped with steel or concrete backstops that redirected bullets into sand traps below. Over time, lead from the bullets contaminated the sand, turning it into hazardous waste. DEQ is honored to help resolve this and other associated environmental problems in order to preserve the historically significant buildings for renewed community use.
Canadian County Trash Fuels Brick Factory

Canadian County Landfill, operated in Union City by the Oklahoma Environmental Management Authority (OEMA), has been collecting waste since 1974. The facility expects to continue in business with some modifications for another 40 years. As with all landfills, waste decomposition at the site produces significant methane gas. This will continue to occur for at least a decade after closure.

Early in 2005, Boral Bricks, Inc. in Union City began constructing its newest facility. The company uses landfill gas for fuel at other locations and was glad to have the option available in Union City, as well. Planning to meet about one-third of his natural gas fuel needs with landfill methane by November 2006, President Bob Kepford said, “Having access to the landfill would provide a fuel for us at a constant price.”

The company plans to construct a collection and treatment system, along with a 2-mile pipeline to transport methane from the landfill to its property. David Griesel, General Manager of the OEMA landfill, says, “This is an exciting project both for the authority and for Boral. It’s an upside for the authority because at some point in time, we would have to install the gas collection systems and do something with the gas. This would save the authority a significant amount of capital.”

Boral Bricks’ system will be installed in the west lobe of the landfill, with expansion capacity. Extraction wells will be distributed across the surface of the landfill. The gas will be collected by vacuum and transported to a refrigeration and compression system. The 2-mile pipeline will end at the north end of a kiln located on Boral Bricks’ property. The kiln will burn the fuel in a mixture with 65 to 79 percent natural gas. Boral Bricks anticipates that in approximately 12 years, the kiln will be able to use landfill gas as its entire fuel source.
The manufacture of bricks is fuel-intensive. Boral Bricks will manage its fuel costs by using landfill gas for a portion of its fuel needs.

Drill rig installs gas collection wells in the Canadian County Landfill.

Driller guides the large drill bit in preparation of installing gas collection well.
The Oklahoma Recycling Association (OKRA) is an organized network of interested individuals and communities working to promote recycling. This year, DEQ hosted OKRA work group meetings to help members develop action plans for achieving the group’s objectives of increasing recycling market development, communications and outreach, waste exchange, K-12 education, and recycling policy. DEQ’s Susie Shields serves as OKRA’s president.

Computers and other electronics contain valuable metals and hazardous material and should be more widely recycled.

Plastic is less often recycled, partly because it is more difficult to process. Its value, however, is increasing with the climbing price of oil.
The Upper Elementary School in Kellyville, Oklahoma, had a surfacing waste problem on its playground. Chunks of broken glass and metal kept appearing after heavy rains, presenting an obvious danger to the children who played there. School employees repeatedly removed the debris by hand, but the next rain would bring more to the surface. The school needed a permanent solution.

DEQ’s Land Reclamation Program specializes in finding innovative, affordable ways to deal with sites that sometimes do not normally fall within the jurisdiction of agency programs. Investigating the history of the property, DEQ could find no record of a dump or landfill. A store used to be located on the land. DEQ staff concluded that perhaps the store owner dumped or burned trash on the site, leaving behind the glass and metal debris, or perhaps the demolition or destruction of the structure could have been responsible. DEQ believed that the problem was contained within the top foot of soil, and therefore was not the result of an undocumented landfill or other extensive buried-waste problem.

DEQ partnered with the Kellyville School System, the Okmulgee County Conservation District, the City of Tulsa, Bristow Rubber Recycling, LLC, and its parent company, Permalife Corporation, to fix the problem. The playground was graded with a box blade to remove the top six inches of debris-containing soil, which was disposed of properly. Next, finely ground woodchips were spread over the entire area. Pour & Play™, a rubber mulch made from recycled tires, was placed under the playground equipment.

The playground was soon safe for children to use again. Donations of equipment, employee time and effort, “regrind” woodchips, and mulch from used tires made the project affordable for the small school district. The district gave DEQ a much-appreciated A+ for its part in the project.
Panhandle State University in Goodwell, Oklahoma, is closer to Texas, Kansas, Colorado and New Mexico than to Oklahoma City, so PSU officials depend on the local DEQ office to answer their environmental questions. PSU recently had a small environmental problem arise. The university wanted to use the basement of a classroom building, but the space had been used previously as an ROTC firing range. Indoor firing ranges often are contaminated with lead, concentrated in the sand that absorbs the bullet’s energy after it hits the steel backstop and drops into a sand trap.

University staff turned to the local DEQ Environmental Complaints and Local Services office for advice and assistance. ECLS contacted the Land Protection Division (LPD) to learn how the sand might be reused. Sampling data indicated that the sand was too highly contaminated for any reuse unless it was first extensively treated. However, LPD suggested, a waste disposal company that was facing a DEQ-imposed fine might be willing to remove and dispose of the sand in lieu of a portion of the fine. The company in question agreed, and the cleanup was successfully completed in May 2006.