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This report highlights accomplishments in the varied land restoration projects underway at the DEQ. It provides the context for each remediation program, showcases progress on projects, lists the universe of sites in each program, and provides maps depicting project locations. This report is also available on our website at www.deq.state.ok.us under the Publications heading.
The Oklahoma Brownfields Voluntary Redevelopment Act was signed into law June 1996. Last year, the federal Small Business Liability Relief Act was passed into law and clarifies liability under Superfund, expands the universe of eligible sites and provides funding for state and tribal programs. The Oklahoma Brownfields Act creates a voluntary program for the redevelopment and reuse of brownfields (contaminated sites) by limiting the liability of property owners, lenders, lessees and successors from DEQ actions. The Brownfields Program provides legal certification that the property has been cleaned up to a level that is appropriate for the planned reuse. The certification clears the participant and any future owners, lenders, lessees, etc., from environmental liability associated with historical contamination. It also provides DEQ’s covenant not to sue for environmental problems addressed during the cleanup, and it provides protection from the federal Superfund program. Low interest loans are available for the cleanup of brownfields sites, and new federal legislation provides grants to communities and non-profit organizations for the assessment and cleanup of brownfields. This option is often chosen when the owner wishes to sell the property or when a lender is concerned about its liability. Several very significant sites have been cleaned up under this program.

The DEQ also operates an informal voluntary cleanup program for those who do not need or desire the protection provided by the Brownfields Program. Sites in the Brownfields Program and informal voluntary cleanup program are being addressed through consent orders, the instrument used to formalize commitments to address the cleanups. The consent orders include reimbursement for DEQ’s oversight costs for voluntary cleanups.

Duncan Refinery Voluntary Cleanup
Brownfields/Voluntary Cleanup Sites

Blackwell Zinc
Voluntary Cleanup – NPL Deferral
Blackwell, Kay County
DEQ Contact:
George Thomas
(405) 702-5126

Status:
Ecological Unit:
Completed 1996
Soil Unit:
Completed 2001
Ground Water Unit:
Remedial Design

The Blackwell Zinc Site was a horizontal-retort smelter that operated from 1916 to 1972. Historical operations resulted in lead, cadmium and zinc contamination in the soils and cadmium and zinc contamination in the ground water.

The soil cleanup was completed in 2001 under a consent order between the DEQ, Phelps Dodge Corporation and the Blackwell Industrial Authority. The ground water will be remediated by extracting the contaminated ground water using a series of pumping wells, removing the metals in an on-site treatment plant and discharging the treated water.

Phelps Dodge is completing the engineering design for the ground water remedy.

This year the Burlington-Northern Sante-Fe Railroad completed soil investigations on railroad properties in the Blackwell area. The data will be compiled in a report and submitted to the DEQ. The report will identify areas on the railroad’s property that require cleanup.

Boynton Refinery
Voluntary Cleanup
Boynton, Muskogee County
DEQ Contact:
Scott Stegmann
(405) 702-5118
Status:
Site Characterization

This 48-acre site operated as a petroleum refinery from 1917 until it was abandoned in 1933. The refinery produced a variety of oil products including paraffin wax, motor oil, gasoline and kerosene. Waste areas at the site include a large tar pit, several smaller pits containing refinery waste and other assorted waste areas.

Marathon Oil, through a consent order with the DEQ, has agreed to conduct a Site Characterization of the former refinery. Preliminary Site Characterization work was conducted in September 2004, including a stratigraphic survey and determining site ground water conditions. Site Characterization will continue in 2005. Once characterization is completed, Marathon and DEQ will evaluate options for site cleanup and reuse.
Duncan Refinery  
Voluntary Cleanup  
Meridian, Stephens County  
DEQ Contact:  
Amy Johnson  
(405) 702-5133  
Status:  
Interim Action &  
Remedial Investigation  

ConocoPhillips, Stephens County and the DEQ signed an agreement in April 2003 to investigate and clean up this 400-acre inactive refinery, located five miles south of Duncan. It operated from the 1920s until 1983. The refinery was never properly closed, leaving many serious environmental problems. These included oil and chemicals seeping into the creek, deteriorating vessels containing a range of waste materials, waste pits, oily wastewater ponds and significant amounts of badly deteriorated asbestos.

ConocoPhillips is currently working with the DEQ to mitigate oil and chemical seeps to Clarity Creek. ConocoPhillips has also completed a survey of the asbestos at the refinery and performed a preliminary investigation of the Hydrofluoric Unit. Additional actions and a more complete investigation of the interior of the site are underway.
Federated Metals Cimarron Center Brownfields

Sand Springs,
Tulsa County
DEQ Contact:
Ray Roberts
(405) 702-5137
Status:
Remediation Complete

CIMARRON CENTER WINS REGIONAL PHOENIX AWARD™

The Cimarron Center Redevelopment Project in Sand Springs, Oklahoma has been awarded the 2004 Regional Phoenix Award™. The award honors individuals and groups that transform abandoned industrial sites into productive new uses. The Cimarron Center was built on the location of the Federated Metals former zinc smelter. Kucharski Development Company partnered with Federated Metals to clean up the site and redevelop it into a center of commerce for the community of Sand Springs. Several retail stores including a Wal-Mart Super Center have opened at the Cimarron Center.

Cimarron Center

A Wal-Mart Super Center
350 new jobs — retained 300 jobs
Expected gross sales of $80 million in its first year and to top $100 million by 2008.
Projected more than $3.5 million a year in city sales tax revenues.

Other Stores
Eyemart Express
Quick Trip

The award was presented to Kucharski Development at a special ceremony at the 2004 Brownfields Conference.

The Cimarron Center is located at the intersection of U.S. Highway 64/412 (the Sand Springs Expressway) and State Highway 97.

The project’s nomination for the Phoenix Award was based on the positive economic impact that the project brought to Sand Springs. The site was cleaned up under the authority of the Oklahoma Department of Environmental Quality’s Voluntary Cleanup and Brownfields Redevelopment Program.
M-D Products
Voluntary Cleanup
4041 N. Santa Fe
Oklahoma City,
Oklahoma County
DEQ Contact:
Ray Roberts
(405) 702-5137
Status:
Site Investigation

M-D Products is an active manufacturing facility. M-D entered into a consent agreement with the DEQ on October 29, 2001 to investigate ground water contamination by chlorinated solvents and free phase mineral spirits. Interim measures are being undertaken to recover mineral spirits. A dozen new monitor wells were recently installed. Site investigation to delineate the extent of contamination continues.

Michelin North America
Former B.F. Goodrich Tire Plant
Miami, Ottawa County
DEQ Contact:
Ray Roberts
(405) 702-5137
Status: Remedial Design

The former B.F. Goodrich Tire Plant operated from the 1940s until 1983. Michelin entered into a consent order for investigation and remediation in October 1997. The site has subsequently been investigated. Follow up is being done on a benzene plume that has gone beneath a residential area near the plant. Michelin is developing a remedial plan for the contaminated ground water.

Phoenix Award
Created in 1997 to honor the groups that develop significant brownfields sites across the country. An independent panel of environmental professionals and business, academic and government leaders select the winners. Seeks to recognize innovative yet practical remediation projects, which bring blighted, old commercial and industrial sites back to productive use.
Pure Oil Refinery
Voluntary Cleanup
Ardmore, Carter County
DEQ Contact:
Kendel Posey
(405) 702-5120
Status: Investigation and Interim Remedial Actions

The 70-acre former Pure Oil refinery, located in the northeast portion of Ardmore, in Carter County, operated from approximately 1916 until 1936. Union Oil of California acquired Pure Oil Company in 1965. The former refinery consisted of a refining process area surrounded by above ground storage tanks that contained fuel oil, benzene butts, gas oil, refined oils, stripped crude, crude oil and gasoline. Early maps show a pond on the southeast portion of the site, which is still visible today. Two coke piles remain on the southeastern boundary of the property.

Clean up work for 2003-2004 focused on the removal of: the concrete sump and 32 tons of non-hazardous waste; a separator with 189.5 tons of soil and petroleum material; sub-grade wooden and brick structures and an area of solidified petroleum material. To date 733 tons of non-hazardous waste have been removed, with approximately 1,200 tons of hazardous waste left in place which will be cleaned up in 2005.

Ottawa Management Corporation – Former B.F. Goodrich Tire Plant
Miami, Ottawa County
DEQ Contact:
Ray Roberts
(405) 702-5137
Status: Remediation

The former B.F. Goodrich Tire Plant operated from the 1940s until 1983. Ottawa Management Corporation, as the current owner, is under a court order from the Ottawa County Court to perform an asbestos abatement on the 30-acre building. A large portion of the facility has been abated; however, a significant area inside the plant remains to be abated.
DEQ’s Brownfields Targeted Site Assessment program is designed to help non-profit entities, tribes, and municipalities identify contamination to help promote cleanup and redevelopment of brownfields. Once contamination at a site is assessed, redevelopment is made easier.

DEQ provides technical assistance for environmental assessments at brownfields sites under a Brownfields Assistance Agreement with the U.S. Environmental Protection Agency. A Targeted Site Assessment may encompass one or more of the following activities:

- A background and historical investigation and a preliminary site inspection;
- A full environmental assessment, including sampling to identify the contaminants and areas to be cleaned; and
- Establish cleanup options and costs for future uses and redevelopment.

The Brownfields Law made additional properties eligible for this funding, including mine-scarred land, properties contaminated by a controlled substance and petroleum-contaminated properties of relatively low risk.

The program does not provide funds to conduct cleanup or building demolition activities. The costs of these assessments are usually anywhere from $10,000 to $20,000.

For More information
Contact Hal Cantwell at (405) 702-5139
Sampling an old dry cleaner

Sampling at an abandoned refinery

Sampling a waste storage tank

DEQ HAS PERFORMED TARGETED SITE ASSESSMENTS STATEWIDE:

Woodward  Woodward  Sulphur
Keyes  Keyes  Newcastle
Grandfield  Grandfield  Muskogee
Chilocco  Chilocco  Oklahoma City
Kaw City  Kaw City  Sand Springs
Bethel Acres  Bethel Acres  Ardmore
Frederick  Frederick  Chickasha
Medicine Park  Medicine Park
### Additional Brownfield/Voluntary Cleanup Sites

Numerous other sites are undergoing Brownfield/Voluntary cleanups. Information is available from the DEQ Contact

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<thead>
<tr>
<th>Site Name</th>
<th>Proj Mgr</th>
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See map on page 14 for locations of these sites. For specific information, please contact the DEQ staff member listed to the right of each site in the list above.
Active Brownfield/Voluntary Cleanup Sites Map

VCP Brownsfields Sites Map 1

Sampling during a Targeted Site Assessment

Installing a monitor well for a Targeted Site Assessment
Map of Brownfield/Voluntary Cleanup Sites completed in 2004

VCP Brownfields Sites Map 2

Brownfield/Voluntary Cleanup Sites completed in 2004

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<tr>
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<td>Oklahoma City</td>
<td>Jarrett Keck (405) 702-5121</td>
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<td>Git-n-Go</td>
<td>Tulsa</td>
<td>Robert Replogle (405) 702-5131</td>
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<td>City of Broken Arrow</td>
<td>Broken Arrow, Wagoner Co.</td>
<td>Jarrett Keck (405) 702-5121</td>
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<td>Nonni’s Food Company</td>
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<td>Amil Lyon (405) 702-5140</td>
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The 1976 Resource Conservation and Recovery Act (RCRA) was the nation’s first comprehensive hazardous waste management law. It created a regulatory system that governed the treatment, storage and disposal of hazardous waste and has subsequently been delegated to the State by the federal government. RCRA has been amended several times, and for the most part, addresses land disposal of hazardous waste and corrective action.

**Chief Supply/Greenway Environmental RCRA Cleanup Site**

Stone Bluff, Wagoner County

DEQ Contact:

Cindy Hailes
(405) 702-5114

Status: Closure

In 2004, the EPA and DEQ worked together to conduct removal activities at this former hazardous waste treatment, storage and disposal facility. The 19-acre facility operated as Chief Supply between 1984 and shut down in 1997 following a fatal explosion and fire at the facility. In 1997, the bankruptcy court awarded Greenway Environmental Inc., control of the facility. Greenway operated the facility until 2000 when the operational permit was relinquished and the site was abandoned with hazardous waste onsite.

The removal action conducted in 2004 disposed of all hazardous waste at the abandoned site. Equipment, including large reactors, were emptied of contents, dismantled and shipped offsite for disposal. Federal EPA dollars and a portion of the $175,000 settlement between the DEQ and Chief Supply’s insurance company funded the removal.

DEQ is evaluating work remaining for closure and post-closure care of this facility.

*Demolishing a reactor vessel at Chief Supply/Greenway*
Clean Harbors Lone Mountain
RCRA Generator Cleanup Site

Major County
DEQ Contact:
Sam Ukpaka
(405) 702-5148
Status:
Active Remediation

Clean Harbors in Lone Mountain is a commercial facility that treats, stores and disposes of hazardous and non-hazardous wastes generated in the United States. This facility has been in operation for 26 years. DEQ permits and provides regulatory oversight of this facility.

In addition to ongoing ground water remediation of a disposal cell, this year the facility investigated another disposal cell for the release of volatile organic compounds. The investigation will help determine what, if any, response is required.

Conoco, Ponca City Refinery
RCRA Generator Cleanup Site

Ponca City, Kay County
DEQ Contact:
J. David Lawson
(405) 702-5104
Status:
Operation and Maintenance

The Conoco Ponca City Refinery, located along the southern edge of Ponca City, includes a petroleum refinery, a corporate research and development operation, bulk petroleum storage operations, and a management services organization. This site has been used for petroleum refining since the early 1900s. As a result of past practices, the site has an underground plume of petroleum product and contaminated ground water. RCRA facility investigations identified several areas that needed to be cleaned up.

The refinery is working to contain and recover the underground petroleum product plume and to remediate contaminated ground water using over 400 ground water monitoring wells and by pumping the hydrocarbons and ground water to the surface. Over 4,500 barrels of material were recovered in 2004. Several years of investigation have resulted in “no further action” findings for many refinery waste units. Recovery and treatment of the hydrocarbon plume and contaminated ground water will continue.

Old Enid Refinery
RCRA Generator Cleanup Site

Enid, Garfield Co.
DEQ Contact:
Hillary Young
(405) 702-5106
Status: Investigation

The Old Enid Refinery operated between 1916 and the mid-1980s. Ownership changed over the years and the Anadarko Petroleum Corporation now owns the property. Today, most of the area where the refinery once stood is a grassy meadow.

Over the years, periodic spills and leakage from the refinery contaminated the soils and ground water beneath the facility. An oil recovery system removed liquid petroleum from the ground water for a ten-year period and routine ground water sampling has been ongoing.

In 2003, the DEQ Land Protection Division reviewed existing data and decided that more investigation was needed to get a “snapshot” of current conditions over a larger area, including offsite properties. In November of 2003, the DEQ and Anadarko cooperated on sampling some 50 monitoring and private water wells in areas to the north and south of the refinery property. Anadarko has done pilot testing and is now conducting soil vapor sampling to determine if there might be impacts to indoor air quality from the contaminated ground water that has migrated off-site.
Sun Company, Inc. Sunoco R&M
RCRA Generator Cleanup
Tulsa
DEQ Contacts:
Don Hensch
(405) 702-5152
Status: Investigation and Monitoring

This refinery, located on the banks of the Arkansas River, has operated since 1913. The site covers over 800 acres, operates 24 hours a day, and employs approximately 700 people. The refinery is an integrated complex with a crude oil capacity of 90,000 barrels per day. Crude oil is refined into a variety of petroleum products. The bulk of the hazardous waste that is generated is managed in the wastewater treatment process. The refinery also generates tank bottoms and some solvent wastes in the maintenance and electrical shops.

Sun has worked under DEQ permits to use land treatment for the onsite disposal of both hazardous and non-hazardous wastes. Sunoco has an extensive free phase hydrocarbon plume on the groundwater below the facility. Additional information on groundwater has been submitted and is under review by the DEQ. Sunoco has performed several focused investigations on older disposal areas and is cleaning up these older disposal sites to formally close them. This work is planned to continue through 2006. The DEQ is currently in the process of reviewing the status of a Sun Permit Renewal Application.

Tinker Air Force Base
RCRA Program

Oklahoma City,
Midwest City & Del City
DEQ Contacts:
Robert Replogle
(405) 702 5131
Status: Investigation and Cleanup

Tinker Air Force Base (TAFB) has completed most of the requirements of a RCRA Facility Investigation. The soil clean up is complete, and a separate investigation of ground water under the entire facility is taking place. Several waste management units have been cleaned up. All Base landfills have been closed and covered with caps. A complex ground water recovery system in the southwest quadrant of the base impedes the movement of contaminated ground water.

In response to the discovery of contaminated ground water offsite in November 2000, Tinker initiated a plan to provide residents of a neighborhood to the southwest with connections to public water. The Air Force selected a new, innovative technology for the clean up of the contaminated ground water.
In May 2004, the Base awarded GeoSierra, LLC, the contract to construct a permeable reactive barrier. GeoSierra has developed a trenchless, deep permeable reactive barrier technology that is much less destructive to the surface and produces a fraction of potentially hazardous excavated soil to be disposed of compared to conventional trenching. The barrier was completed in August 2004.

Tinker continues to remediate ground water at various waste management sites on the Base. Several sites have completed restoration work under RCRA this year including a former fire training area, an old fuel tank, a closed sludge lagoon and a former waste pit.

The Zinc Corporation of America zinc refinery in Bartlesville accomplished a major milestone this year. The DEQ accepted the certifications of closure on October 19, 2004, eleven years after work began to close the facility.

Historical operations at this metals refining facility resulted in contamination of several areas. The clean up consisted of consolidating and capping the wastes onsite. Now that the closure is complete, the facility will maintain the cap and monitor the ground water.

Several areas of this formerly contaminated facility are being used by other businesses.
Additional RCRA Generator Cleanup Sites

There are numerous other sites undergoing generator cleanups.

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<td>Newcastle Land - Newcastle</td>
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Resource Conservation and Recovery Act (RCRA) Sites

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The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or Superfund, was enacted in 1980. It created a large-scale national program to identify and clean up sites contaminated from previous hazardous waste management practices. This effort is known as Superfund because CERCLA established a national trust fund to pay for cleanup at sites whose owners were no longer available or financially solvent. CERCLA also established a mechanism to recover cleanup costs from potentially responsible parties (PRPs).

Thirteen sites in Oklahoma are on EPA’s national priorities list (NPL). Sites on the national priorities list are often referred to as Superfund sites. The DEQ is the designated lead agency for remediation activities on five of these Superfund sites.

Remains of the catalytic cracker at ORC

Refinery wastes
Double Eagle Refinery  
NPL-Superfund  
Oklahoma City  
DEQ Contacts:  
Amy Johnson  
(405) 702-5133,  
Dennis Datin  
(405) 702-5125

Status:  
Source Control:  
Remedial Action complete  
Groundwater:  
Remedial Action ongoing

These two Superfund sites are contiguous property in south central Oklahoma City. Both operated as oil re-refiners over many years, one beginning in 1929 and the other in 1940. Because the sites share common ground water monitoring wells, they are listed here together.

Historical operations resulted in widespread deposition of residual waste, mostly in pits, on both sites. These pits were generally acidic tar sludges with high lead concentrations. On both sites, the acidic sludges were neutralized, stabilized and disposed of in an off-site landfill. The excavated areas were filled with clean soil and vegetated. The surface is considered clean and available for reuse.

Fourth Street Refinery  
NPL-Superfund  
Oklahoma City  
DEQ Contacts:  
Amy Johnson  
(405) 702-5133,  
Dennis Datin  
(405) 702-5125

The ground water in the alluvial and shallow Garber-Wellington aquifers under the site are contaminated with chlorinated solvents, hydrocarbons and metals from the refining operations. DEQ sampled the 13 wells for five years to establish background and last year completed three years of semi-annual monitoring.

At the end of 2004, DEQ drilled additional shallow wells and sampled the ground water to identify possible off-site contaminant sources and to evaluate vapor intrusion as a possible pathway for contamination. This area is part of Oklahoma City’s Empowerment Zone, which is in part a local, state, and federal initiative to allow for redevelopment. The results of the sampling will assist all parties in developing appropriate reuse and long-term monitoring strategies.
The 200-acre Hudson Oil Refining
Company was active from 1922 to 1982 and
produced liquid propane gas, gasoline,
diesel fuel, fuel oils, and coke. The refinery
was not properly closed and various chemi-
cals were left onsite, including 6,000 gallons
of anhydrous hydrofluoric acid. EPA
conducted several emergency response
actions at the site to remove an abandoned
laboratory, various chemicals, hydrofluoric
acid and asbestos. EPA also demolished the
refinery superstructure and removed tanks
and their contents.

Starting in July of 2004, the DEQ began
site-wide investigations of the soil, sedi-
ment, surface water, air and ground water.
This first phase of investigation concluded
in October 2004.

The data gathered will be compiled by
the consultant in a report for the DEQ in
January 2005. These results will be used to
identify risks to human health and the
environment and will help DEQ formulate
alternatives for cleanup. From these alter-
natives, a proposed remedy will be selected
and will be available for public comment
and review.

The DEQ holds periodic public meet-
ings on progress and activities at the site.
Site documents are available to the public at
the Cushing Public Library.

**THE SITE RECEIVED THE USEPA
REGION 6 ADMINISTRATOR’S STRA-
TEGIC ALLIANCE AWARD IN 2003.**
Installing monitor wells at the Hudson Superfund site

Checking a core sample

Sampling monitor well at the Hudson site
Imperial Refining Company
NPL Site - Superfund
Ardmore, Carter County
Contact:
Angela Brunsman
(405) 702-5135
Status:
Remedial Investigation /Feasibility Study

The Imperial Refining Company is an 80-acre abandoned crude oil refinery located on both sides of State Highway 142 in east Ardmore. Imperial operated from 1917 to 1924. All tanks and storage equipment were dismantled by 1948. Numerous waste pits, waste piles and water impoundments are contaminated with metals and hydrocarbons and have impacted an adjacent wetland. The site was listed on the National Priorities List (Superfund) in July 2000. Since then the DEQ has been working with the EPA, the Agency for Toxic Substances and Disease Registry and the U.S. Fish and Wildlife Service to develop investigative strategies.

In September 2004, at DEQ’s request, the EPA installed a perimeter fence to limit access to the wastes on site. DEQ is hiring a consultant to perform a site-wide investigation that will assess the risk to human health and the environment and will help determine alternatives for cleanup. The investigation should begin in January 2005. DEQ will hold periodic public meetings to keep the community informed of work and progress at the site.
Oklahoma Refining Company (ORC)
NPL Site - Superfund
Cyril, Caddo County
DEQ Contact ORC South
Angela Brunsman
(405) 702-5135

DEQ Contact ORC North:
Ray Roberts (405) 702-5137

**ORC South**
Status: Remedial Action

**ORC North**
Status: Emergency Removal

ORC is a 220-acre abandoned oil refinery that operated from 1908 to 1984. Petroleum related contamination of soil, sediment and shallow ground water resulted from leaking tanks, product lines, pits and impoundments.

**ORC South:**
The site was placed on the National Priorities List in February 1990. The remedy, completed in 2002, included bioremediation, in-situ stabilization, neutralization and disposal in onsite landfills. The ground water remedy was postponed until the source remedial action was complete. DEQ and EPA are evaluating the next steps for ground water monitoring and remediation.
**ORC North:**

Until September 2002, the north portion of the ORC refinery was considered an “active” facility and was regulated under RCRA. The site has subsequently been referred to Superfund. Numerous drums of unknown chemicals were improperly stored. An abandoned laboratory with numerous chemicals remained onsite. Tanks were leaking unknown contents. Deteriorated asbestos hung from vessels and littered the ground. The DEQ requested assistance from EPA’s removal section to address the immediate problems, based on an imminent threat to the health and safety of the community. EPA is currently conducting an Emergency Response at the site. Significant cleanup has been accomplished this year. The Emergency Removal has already removed the laboratory chemicals and the drums at the facility. The site is now fenced and the refinery superstructure has been taken down. Almost all of the tanks in the tank farm have been emptied and removed. The DEQ and EPA will continue to work closely together on this project.
Tar Creek
NPL - Superfund
Ottawa County
DEQ Contacts:
David Cates
(405) 702-5124,
Dennis Datin
(405) 702-5125
Mary Jane Calvey
(405) 702-5157

Tar Creek is Oklahoma’s largest and most challenging Superfund site. The Oklahoma portion of the former Tri-State Mining District encompasses more than 40 square miles, five towns, and an entire watershed in far northeastern Oklahoma.

Extensive lead and zinc mining and ore processing in the area left tons of mine waste in huge piles (called chat) and flotation ponds that contain high concentrations of lead and zinc and other heavy metals. The shallow aquifer had always contained the minerals from the surrounding formations. But when the mines refilled after the mining and pumping ceased, seeps of metal laden, sometimes acidic mine water further contaminated the streams in the area. This led to contaminating the shallow ground water and surface water with iron, sulfate, zinc, lead and cadmium throughout the Tar Creek area. The area is also covered with abandoned mine shafts and subsidence features that pose safety hazards to the citizens in the area.

Exposure to lead from the mining wastes has resulted in elevated blood lead levels in children. Early actions at this site were focused on mine discharges to surface water, but as information became available on the effects of lead to area children, EPA began work to remove lead from residential yards and other high access areas.

The site is divided into four different operable units, which are described below.

Operable Unit 1: Ground Water and Surface Water in Tar Creek

Status: Operations and Maintenance
Remedial action began in 1986 with plugging of ground water wells and the construction of dikes to divert mine discharges from Tar Creek and to reduce inflow of surface water into the mines. The diversion dikes did not function as intended and mine discharges continue unabated. DEQ has been the lead on monitoring of public water supply wells and other monitoring wells in the Roubidoux aquifer to assess whether the shallow contamination is impacting the deeper aquifer. Several deep wells that could serve as conduits between the two aquifers are being plugged.

Continued on next page
Operable Unit 2: Residential Property

Status: Remedial Action

Removal of contaminated residential soils began in 1997 and continues today. To date, the EPA has cleaned up 2,053 residential properties with approximately 300 additional properties remaining. The cleanup consists of removing soil contaminated above 499 mg/kg lead and replacing it with clean soil. An aggressive health education campaign headed by the Ottawa County Health Department on how to reduce exposure to lead is also part of the remedial action and is ongoing. Since the start of this work, the percentage of elevated blood lead levels in children in Ottawa County has dropped from 33 percent to three percent.

Operable Unit 3: Drum Removal in Cardin

Status: Complete

Operable Unit 4: Nonresidential Properties

Status: Remedial Investigation/Feasibility Study

The EPA is working with two mining companies and the federal Department of Interior as potential responsible parties for the investigation and feasibility study of the mine wastes. The plan is to sample chat piles, millponds and soils to assess risk to human health and the environment and to formulate alternatives for cleanup. This work began in 2004.

Oklahoma Plan for Tar Creek:

This plan is a multi-faceted, multi-agency strategy to resolve the environmental legacy of mining in the site’s perimeter and to mitigate immediate hazards site-wide. Design and implementation of the projects began in 2004.

Projects include:
- passive treatment of metal-laden surface water
- removing chat from selected streams
- using chat in asphalt road paving
- reclamation and restoration of mine impacted lands
- reducing mine hazards by plugging mine shafts and filling subsidences
- monitoring remediation
- stakeholder involvement

The goals of this plan, over the next three to five years, are to:
- improve surface water quality
- reduce exposure to lead dust
- attenuate mine hazards
- reclaim land

While this plan addresses mostly perimeter areas, it will address mine shafts and other hazards sitewide. It is designed to integrate with other activities that are pending and underway at Tar Creek. The DEQ is implementing many of these projects and is actively coordinating work by other agencies.
Governor Henry’s Relocation Buyout

The Oklahoma legislature set up a relocation trust authority headed by Rep. Larry Roberts for either buyout and or moving assistance for families in the Tar Creek Superfund area who have children under the age of seven. Scientific evidence shows that those children and developing fetuses are most at risk from exposure to lead. The appropriation for FY 05 included $3,000,000 to buyout homeowners, provide rental assistance to renters and compensate landlords for rent they would not receive from rental properties up to one year. The people who receive this assistance have to agree to move out of the most impacted area. Properties can then be resold or re-rented but not to families with children. In addition, the city utilities and the school would be compensated for lost revenue due to declining customer base for a period of up to 10 years. A private company will be contracted to do the appraisals and comparable valuations of properties.

Tinker Air Force Base NPL Site - Superfund

Oklahoma City, Del City,
Midwest City
DEQ Contacts:
Hal Cantwell
(405) 702-5139,
Robert Replogle
(405) 702-5131

This aircraft maintenance and rebuilding facility has a long history of industrial use and groundwater contamination. Organic solvents and chromium have contaminated the Garber-Wellington Aquifer. The Superfund cleanup is focused on three operable units: Building 3001, Soldier Creek Surface Water and Sediments and Soldier Creek/Industrial Waste Treatment Plant Ground water.

Building 3001 Operable Unit:
Status: Remedial Action

A ground water remediation project started in 1990 using a pump and treat system for contaminated ground water. Tinker Air Force Base has suspended the pump and treat operations for one year to study its effectiveness and to investigate additional remedial alternatives. This shutdown period will allow the aquifers to recharge so Tinker and DEQ can re-evaluate the aquifers in a static state.

If any evidence of migration occurs during this temporary shutdown, then Tinker will immediately restart the pump and treat operation.

Soldier Creek Surface Water & Sediments Operable Unit:
Status: Remedial Action

The 1993 Remedial Investigation and Feasibility Study Risk Assessment for Soldier Creek showed that water and sediment contamination levels were below concern for human health risks. The remedy requires periodic monitoring of water in the creek and its sediments. The monitoring of the creek will continue for a number of years. The DEQ recently approved a five-year review that showed the selected remedy has adequately maintained protection of human health and the environment.

Soldier Creek /IWTP Ground Water Operable Unit:
Status: Proposed Plan

The DEQ, Tinker Air Force Base and EPA are working closely to select a remedy to address metals and organic chemicals contamination in groundwater beneath the northeast quadrant of the Base. The remedy should be chosen in 2005.
Tulsa Fuel & Manufacturing
NPL - Superfund
Collinsville, Tulsa County
DEQ Contact:
George Thomas
(405) 702-5126
Status:
Remedial Investigation /Feasibility Study

This 50-acre former horizontal retort zinc smelter operated from 1914 until 1925. Preliminary investigations identified arsenic, cadmium, lead and zinc as site contaminants. The site was placed on the National Priorities List in 1999.

In 2004, at DEQ’s request, an emergency response was taken by EPA to erect a perimeter fence to limit access to the contaminants at the site. The area is frequented by fishermen, hunters and berry-pickers. DEQ obtained samples of blackberries from the site for later evaluation of the potential for these plants to uptake metals from the site.

DEQ is leading the investigation by hiring a consultant to perform site-wide sampling to assess risks and to develop alternatives for cleanup based on the results. The sampling should begin in early 2005. The DEQ will hold periodic public meetings to keep the community informed of work and progress at the site.
National Priorities List (NPL) – Superfund

Other sites in the Superfund program

<table>
<thead>
<tr>
<th>Site</th>
<th>Location</th>
<th>Contact</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compass Industries Landfill</td>
<td>Berryhill, Tulsa Co.</td>
<td>Hal Cantwell (405) 702-5139</td>
<td>Operation &amp; Maintenance</td>
</tr>
<tr>
<td>Hardage/Criner</td>
<td>McClain Co.</td>
<td>Hal Cantwell (405) 702-5139</td>
<td>Operation &amp; Maintenance</td>
</tr>
<tr>
<td>Mosley Road Landfill</td>
<td>Oklahoma City</td>
<td>Dennis Datin (405) 702-5125</td>
<td>Remedial Action</td>
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<td>Rab Valley Lumber EPA Removal/AOC</td>
<td>Panama, LeFlore Co.</td>
<td>Karen Khalafian (405) 702-5122</td>
<td>Feasibility Study</td>
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<tr>
<td>Sand Springs Petrochemical Complex</td>
<td>Sand Springs, Tulsa Co.</td>
<td>Dennis Datin (405) 702-5125</td>
<td>Operation &amp; Maintenance</td>
</tr>
<tr>
<td>Tenth Street</td>
<td>Oklahoma City</td>
<td>Dennis Datin (405) 702-5125</td>
<td>Operation &amp; Maintenance</td>
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</table>

Refinery wastes in Muskogee County
Provisions in a 1995 amendment to the Solid Waste Management Act directed the DEQ to work with the Conservation Commission, the Corporation Commission, and the Oklahoma Energy Resources Board to use materials recovered from solid waste projects to restore lands damaged by oil production and mining activities.

This collaboration of agencies is in its ninth year of a successful partnership, with each agency providing expertise in different areas: the Oklahoma Energy Resources Board will typically remove old oil-field equipment and structures and install any needed erosion control structures; the Corporation Commission provides expertise in the remediation of contaminated soils; the Conservation District specializes in restoring the productivity of damaged soil using amendments; and the DEQ facilitates the identification and beneficial reuse of organic material, most often sewage sludge and wood chips.

The reuse of organic material diverts it from disposal at a landfill and helps restore soil and lands to productive uses. The table shows acres under restoration in 2004 and the map shows the locations of these projects.

### Solid Waste Diverted from Disposal for Recycling
- organic wastes
- yard waste
- paper (50% of material discarded every day)
- sewage sludge
- wood chips

### Land Restoration

<table>
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<tr>
<th>FY 2004</th>
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<td>Acres in planning</td>
<td>450</td>
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<tr>
<td>Acres treated</td>
<td>115</td>
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<tr>
<td>Acres in follow-up</td>
<td>300</td>
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### Restoration and Reclamation Sites

- Land Reclamation Sites
- Land Restoration Sites
Eliminating Small Community Blight

Small communities throughout Oklahoma are struggling with the problem of dilapidated structures. Many local governments have been unable to remove this blight due to the high cost of disposal. The Solid Waste Management Act provides relief by eliminating the need for solid waste permits on projects approved by both the DEQ and the appropriate local conservation district. The projects use suitable portions of the structures to restore and reclaim Oklahoma lands.

The DEQ works with local communities and conservation districts to identify dilapidated buildings, ensure that they are free of toxic hazards and develop a plan for using the demolition material to restore scarred land. For many localities this has sufficiently reduced their costs, making blight removal an affordable enterprise.

List of Upcoming Projects for Land Reclamation 2005

<table>
<thead>
<tr>
<th>Hugo</th>
<th>Dustin</th>
<th>Weatherford</th>
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<tbody>
<tr>
<td>Haskell</td>
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<td>Coalgate</td>
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Waste Tires

The Oklahoma Waste Tire Recycling Act was created in 1989 to clean up historical tire dumps and to prevent further illegal dumping by providing a monetary incentive to promote proper disposal. On average, Oklahoma generates about one waste tire per person per year. But, despite recycling options, illegal dumping continues.

Waste tire facilities meeting the requirements of the Waste Tire Recycling Act are eligible to receive compensation from the Waste Tire Recycling Indemnity Fund.

For processing whole tires, reimbursement is $49 per ton of processed tire material. Waste tire facilities are entitled to an additional $48 per ton if they collect waste tires.

River Erosion projects permitted by the Corp of Engineers can be reimbursed at a rate of $2.80 per tire for truck tires and $0.80 per tire for regular tires.

Sites Cleaned Up

In 2003 (most recent year with complete data), remediation work at 35 dump sites was under way. Remediation efforts resulted in removing 125,416 waste tires and the clean up of five sites. Fifty community-wide clean up events were held resulting in the removal of 84,139 waste tires.

Waste tires, when burned, are an excellent source of energy. Nearly 3.4 million waste tires are collected, processed, and marketed by permitted waste tire processors every year. Until recently, the major, but often unstable, markets for processed tires were for use in civil engineering applications, as tire-derived fuel, and as ground rubber used for feedstock to make new products.

Engineering uses of the state’s waste tires has declined significantly over the past few years, and the ground rubber feedstock market, is a relatively small portion of the overall Oklahoma market picture.

The tire-derived fuel market has increased significantly in Oklahoma over the past two years, due to interest from two major cement kilns in the state that burn whole tires for supplemental fuel.

New Facility Permitted

December 2004, the Bristow Rubber Recycling began operating a Waste Tire Processing Facility. The facility plans to convert 2.5 million waste tires annually, via a cryogenic process, into crumb rubber. U.S. markets for the facility’s crumb rubber include playground material, surfacing material for athletic fields, and feedstock for molded products.

Waste Tire Indemnity Fund

As of December of 2002, money entering the Waste Tire Indemnity Fund (Fund) monthly, for allocation to end users, was insufficient, resulting in monthly reimbursements to end users to be prorated. To date, insufficient monthly funding requires that the prorated schedule be continued indefinitely. As of January of 2003, the same scenario occurred with monthly funding allocated to the waste tire processors. To date, insufficient funding requires that the waste tire processors’ prorated reimbursement schedule be continued indefinitely.

Tire dump and community-wide cleanup information through September 2004:

- Number of tire dumps being cleaned up: 33 dumps
- Number of tires cleaned up from those dumps: 179,768 waste tires
- Number of dumps completely cleaned up January – September, 2004: 26 dumps
- Number of Community-wide cleanup events: 41 cleanup events
- Number of tires cleaned up from these cleanup events: 31,754 waste tires
The two major cement kilns in Oklahoma that burn waste tires as a supplemental fuel are Holcim (US) Inc., in Ada, and Lafarge North America in Tulsa. In 2003 Holcim consumed nearly 2.48 million waste tires, and Lafarge burned nearly 500,000 waste tires.

Cement Kilns Find Fuel In Oklahoma’s Waste Tires

While not all of these tires were Oklahoma waste tires, the vast majority were, showing that these two cement kilns have the capacity to burn nearly 2.98 million tires annually, or 88 percent of the waste tires generated annually in the state.

Waste tires are delivered to the cement kilns by permitted waste tires processors, who collect tires from all 77 counties. At the cement plant, the tires are conveyed up to the large rotating cement kilns, and deposited into the kiln which is heated to over 2600° F.

The public’s perception of emissions released during the burning of tires for fuel has not always been positive, but an EPA report suggests the emissions from burning tires in a cement kiln are minimal. After the tires are burned, there is no ash or residue to dispose of because all of the components of the tire are either destroyed, combined into the superheated raw ingredient mix that makes up the cement or captured in the air pollution control devices.

An environmental partnership has emerged between the state and the cement kilns. Oklahoma needs to properly manage several million waste tires annually, and the cement kilns need the waste tires for use as supplemental fuel. Through Oklahoma’s waste tire management program, a steady stream of waste tires are delivered to the kilns, and the kilns in turn properly dispose of the tires.
Waste Tires Map
Locations of tire clean up activity in 2003

Tire Dump Sites

Waste tires on the conveyor belt
Waste tires being hoisted up to the kiln
Waste tire enters the kiln at Holcim