



TAR CREEK SUPERFUND SITE STRATEGIC PLAN

Cleanup Progress
& Plans for the
Future

2019

REVIEW
DRAFT






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PURPOSE

The Tar Creek Superfund Site in Ottawa County, Oklahoma, was placed on the EPA Administrator’s Emphasis List of “Superfund Sites Targeted for Immediate, Intense Action” in 2017 because it is one of the largest and most challenging Superfund sites in the country. Substantial progress has been made since the Governor of Oklahoma established the Tar Creek Task Force in 1980 and the U.S. Environmental Protection Agency (EPA) placed the Site on the National Priorities List (NPL) in 1983. The communities most impacted by mining-related waste have been relocated; cleanups at nearly 3,000 residential and high-access area properties, such as daycare facilities and schoolyards, have been completed; over 4 million tons of mining waste and affected soils have been remediated; and over 800 acres have been reclaimed for reuse. Looking forward, substantial cleanup work remains and will take decades to complete. Near-term cleanup actions for the Site are included in the table below.

Table 1. Tar Creek Site Milestones for 2019-2021

Milestones	Target Completion Dates
<div style="text-align: center;">  <i>Institutional Controls and Partial Deletions</i> </div>	
Enact Conservation Easements on Tribal Land.	First easement completed on tribal land in 2018; three additional easements to be completed in 2019.
Establish Quapaw Nation Land Use Authority.	2019 to 2021
Complete Partial NPL Deletions.	Up to 5,000 acres to be deleted by 2021.
<div style="text-align: center;">  <i>Site Cleanup Progress</i> </div>	
Control Ongoing Releases.	Complete design in 2019 and start cleanup in 2020.
Complete Beaver Creek Chat Piles Cleanup.	2019
Initiate Elm Creek Chat Piles Cleanup.	Start in 2020 and complete in 2022.
<div style="text-align: center;">  <i>Decision Documents</i> </div>	
Issue Mining Waste Record of Decision Amendment.	2020
Issue Watersheds Record of Decision.	2021

This document updates the public on the progress and future plans to address contamination at the Site. The report includes the following sections:

- **Site Background** – describes the activities that resulted in the Site’s placement on the NPL.
- **Success Highlights** – highlights major cleanup successes since 1983.
- **Site Cleanup Management, Milestones and Planning** – summarizes completed and planned cleanup actions at the Site’s five operable units, or OUs. This section also discusses the Site’s institutional controls, site revitalization and redevelopment efforts, and community involvement.
- **Near-Term Strategic Plan (2019-2021)** – describes the cleanup actions and related support planned for the next three years, project leads, funding amounts and sources, and target completion dates, where applicable.
- **Long-Term Strategic Plans (2022 and Onward)** – discusses potential actions EPA and its site partners are considering to accelerate cleanup and reduce costs beyond 2021. These include:
 - Reevaluating land use assumptions.
 - Considering consolidating chat ownership and improving marketability of chat.
 - Exploring innovative technologies.

EPA will evaluate the Site’s remedial actions during each of the statutory five-year reviews to determine whether the Site’s cleanup actions are being protective of human health and the environment.



Before-and-after views of the cleanup of the Distal 6a chat pile led by ODEQ.

PARTNERS

Federal, state, tribal and local governments are committed to continuing to assess and address site contamination and to eliminate, reduce, or manage risks to human health and the environment. The project's governmental partners are:

<i>Federal</i>	<i>State</i>	<i>Tribal</i>	<i>Community</i>	<i>Colleges/Universities</i>
U.S. Environmental Protection Agency – Region 6	State of Oklahoma, Oklahoma Department of Environmental Quality	Quapaw Nation Peoria Tribe of Indians of Oklahoma	Local governments, including the cities of Afton, Commerce, Fairland, Miami, North Miami, Peoria, Quapaw, and Wyandotte	University of Oklahoma Pittsburg State University
U.S. Environmental Protection Agency – Region 7	State of Oklahoma, Oklahoma State Department of Health	Ottawa Tribe of Oklahoma	Ottawa County Health Department	
U.S. Fish and Wildlife Service	State of Kansas, Kansas Department of Health and Environment	Miami Tribe of Oklahoma	Ottawa County Commissioner District #1	
U.S. Geological Survey Department of Interior, Bureau of Indian Affairs	State of Missouri, Missouri Department of Natural Resources	Eastern Shawnee Tribe of Oklahoma Wyandotte Nation Seneca-Cayuga Nation Cherokee Nation Modoc Tribe of Oklahoma	Local Environmental Action Demanded, Inc.	



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SITE BACKGROUND

The Tar Creek Superfund Site has no clearly defined boundaries; it consists of areas in Ottawa County impacted by historical mining wastes. The Site is also part of the Tri-State Mining District, which spans parts of Oklahoma, Kansas and Missouri. Beginning in the early 20th century, the district produced vast amounts of lead and zinc, mostly to support America's efforts in World War I and World War II. The mining era left a legacy of open mine shafts, acid mine water, large areas prone to subsidence, and large volumes of mining and milling wastes (known as chat) contaminated with lead, zinc and cadmium.

The Site first came to the attention of the state of Oklahoma and EPA in 1979, when water began flowing to the surface near Commerce, Oklahoma, from the underground mine workings, through abandoned boreholes. This surface discharge flowed into Tar Creek and soon other discharge locations were observed near Tar Creek, Beaver Creek near Quapaw, Oklahoma, and the abandoned mining town of Douthat, Oklahoma. These discharges caused significant environmental impacts to Tar Creek, Lytle Creek and Beaver Creek. The bottom of Tar Creek became stained red from ferric hydroxide deposition, and red stains appeared on downstream bridge abutments along the creek.

EPA added the Site to the NPL, the Agency's list of top-priority hazardous waste sites, in 1983. EPA then led a series of targeted removal actions to ensure that people could continue to live, work and farm safely in the area. Since NPL listing, EPA has implemented extensive remedial actions across the Site. Today, EPA is continuing cleanup efforts under cooperative agreements with the Oklahoma Department of Environmental Quality (ODEQ) and the Quapaw Nation. The Quapaw Nation's jurisdictional area covers 60,000 acres, including much of the Site. Additionally, the Quapaw Nation has acquired significant areas in a large part of the Site referred to as OU4, including Treece, Kansas.

To date, cleanup has included the relocation of four impacted communities, the excavation of lead-contaminated soils from nearly 3,000 residential yards and high-access areas, and the remediation of over 4 million tons of mining waste and contaminated soil. Other efforts have included surface water management and the plugging of abandoned wells. These activities have significantly reduced the exposure of the population, especially young children, to lead. Reduced exposure has drastically reduced blood lead levels in Ottawa County, which can cause significant long-term health impacts in children.

Sources of Exposure at the Site

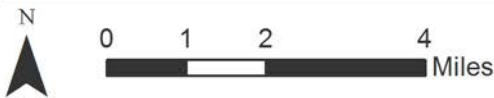
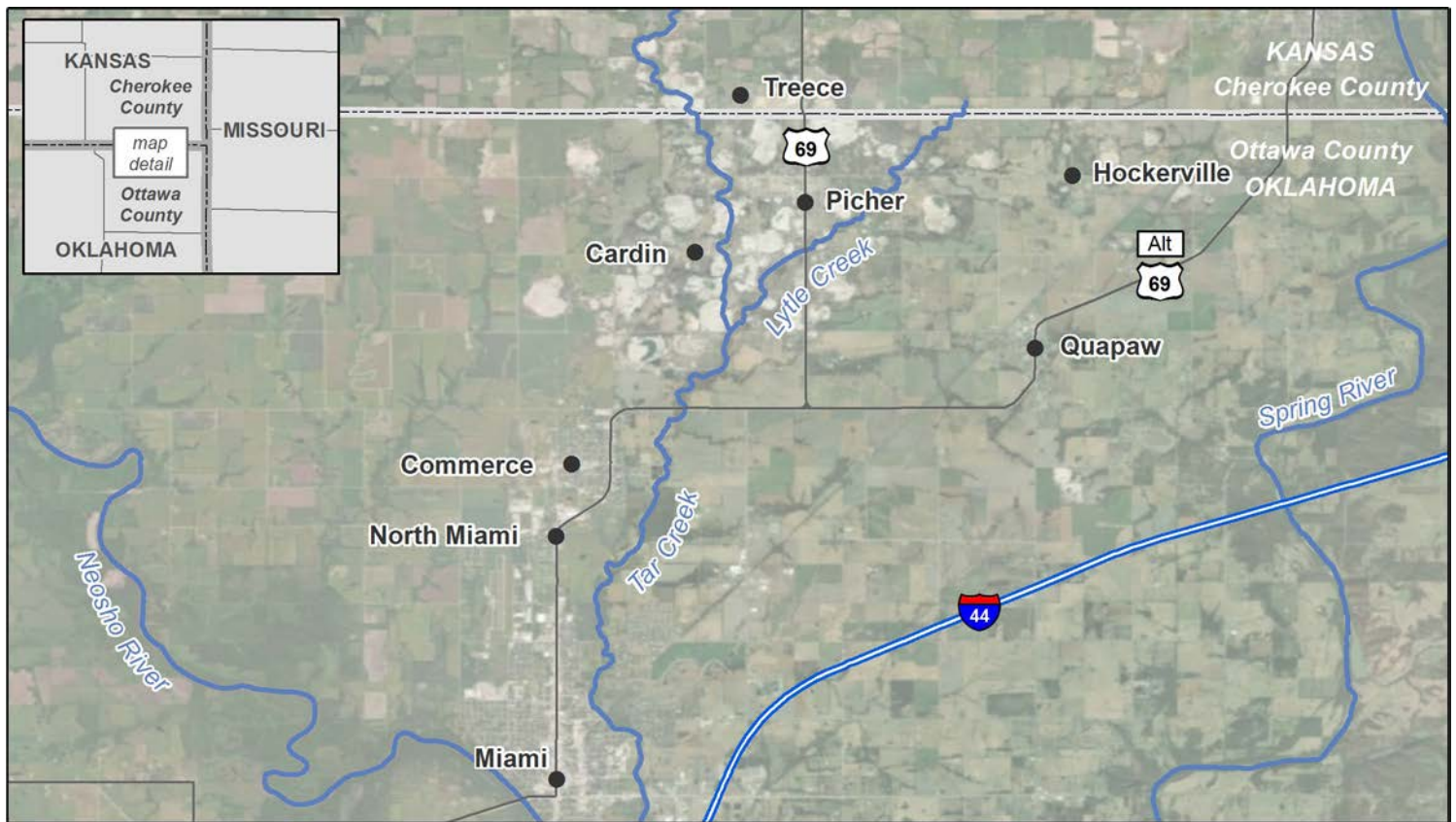
- Chat piles and tailings
- Contaminated surface water
- Contaminated soils
- Contaminated fish and other wildlife or plants
- Contaminated groundwater





Mining-Related Impacts at the Site

- Over 40 million tons of mill tailings (chat piles) located across 105 chat piles covering over 1,000 acres¹
- Over 8 million tons of waste and 243 chat bases (or former piles) occupying over 2,800 acres¹
- 11 million tons of fine mill tailings deposits located in 63 former ponds covering 1,000 acres¹
- 100,000 acre-feet of underground mining cavities
- 100,000 exploratory boreholes
- Over 1,000 mine shafts
- Many abandoned water wells from milling operations
- Extensive groundwater and surface water impacts



Sources: EPA Region 6, Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors and the GIS User Community.

¹ Volume estimates of wastes have been found to be significantly higher than reported in the Site's Remedial Investigation Report. The acreage and volume estimates also include buffer zone soils possibly contaminated above metals' remediation goals requiring cleanup; however, these volumes (i.e., transition zone soils) have also been found to be significantly higher.

MAJOR SITE MILESTONES

Past

1980	Governor of Oklahoma established the Tar Creek Task Force.
1981	EPA proposed the Site for listing on the NPL.
1983	EPA listed the Site on the NPL.
1984	OU1 (surface water/groundwater) Record of Decision (ROD) signed.
1987	Groundwater monitoring in the Roubidoux Aquifer begins.
1994	EPA signed the Site's first Five-Year Review (FYR) Report.
1997	EPA signed OU2 (residential areas) ROD.
2000	EPA signed OU3 (abandoned mining chemicals removal action) Action Memorandum.
2000	EPA removed 120 containers of chemicals from OU3. EPA completes OU3 cleanup.
2000	EPA signed the Site's second FYR Report.
2000	EPA signed Cooperative Agreement with Quapaw Nation. This is the first cooperative agreement with a tribe in the nation.
2005	EPA signed the Site's third FYR Report.
2008	EPA signed OU4 ROD (chat piles, other mine and mill waste, smelter wastes).
2008	Mayer Ranch Passive Treatment System construction completed.
2009	OU4 – Voluntary buyout and relocation began for communities of Picher, Cardin and Hockerville, Oklahoma.
2010	EPA signed the Site's fourth FYR Report.
2011	OU4 – Voluntary buyout and relocation completed for communities of Picher, Cardin and Hockerville, Oklahoma.
2012	OU4 – Voluntary buyout and relocation began and was completed for community of Treece, Kansas.
2014	Quapaw Nation completed cleanup of the Catholic 40 property through a cooperative agreement with EPA; this was the first-ever tribal-led Superfund cleanup in the nation performed by a tribe on their own property.
2014	OU1 (surface water/groundwater) operation and maintenance (O&M) under ODEQ begins.
2014	OU2 (residential areas) – ODEQ becomes lead on remedial design and remedial action.
2014	OU4 (chat piles, other mine and mill waste, smelter wastes) – ODEQ becomes lead on remedial action for non-tribal properties.
2014	EPA completed OU4 Remedial Action Optimization Report.
2015	EPA started OU5 (sediment and surface water) remedial investigation and human health risk assessment.
2015	EPA signed the Site's fifth FYR Report.
2017	EPA completed OU5 data gap sampling.
2017	Southeast Commerce Passive Treatment System construction complete.



Future

2018	OU1 – O&M ongoing (inspection of dikes and diversion structures, groundwater monitoring); more than 83 abandoned wells have been plugged; additional wells to be plugged as identified.	ongoing	OU1 – Plugging of abandoned wells and operation and maintenance to continue (inspection of dikes and diversion structures, groundwater monitoring).
2018	OU2 – Sampling of Ottawa County residential properties ongoing; 2,940 properties remediated to date; more to be sampled and remediated by ODEQ.	ongoing	OU2 and OU4 – Remedial actions to continue through cooperative agreements with Quapaw Nation for OU4 and ODEQ for OU2 and OU4; ODEQ to sample soil of additional OU2 residential properties, as identified. Cleanup of Beaver Creek chat piles to be completed in 2019. Cleanup of Elm Creek chat piles to start in 2020 and finish in 2022. Complete remedial design for Core Area in 2020 and plan for remedial action.
2018	OU4 – Remedial actions ongoing through cooperative agreements with Quapaw Nation and ODEQ; more than 4 million tons of chat have been removed from properties and more than a half-million tons of chat have been provided to chat processors to be sold.	ongoing	OU5 – Remedial investigation, human health risk assessment, and feasibility study to continue.
2018	OU5 – EPA continuing remedial investigation and human health risk assessment. EPA initiated feasibility study.	ongoing through 2021	Establish Quapaw Nation land use authority.
		2019	Continue enacting conservation easements on tribal land.
		2019	EPA and ODEQ to begin site's sixth FYR, for completion by 2020.
		2020	Issue mining waste ROD amendment (OU4).
		2021	Issue watersheds ROD (OU5).
		2021	EPA to delete portions of OU2 and OU4 from the NPL (up to 5,000 acres).



Present

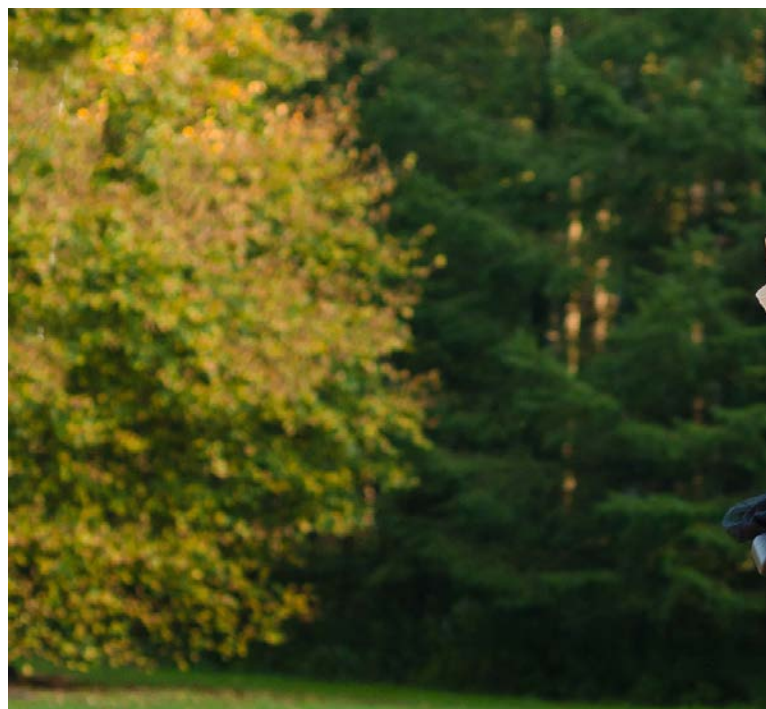
SUCCESS HIGHLIGHTS



Blood lead levels of Ottawa County children have been significantly reduced



Public education and outreach efforts to protect children from exposure to lead are ongoing



Over 800 acres of land, previously covered by chat, made available for future use



1983 to 2018



2,940 residential and high-access area properties cleaned up



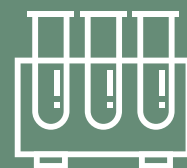
Four communities relocated

4

Over 83 abandoned wells plugged



Groundwater monitored since 1987



Substantial work completed at four of the Site's five OUs completed



SUCCESS HIGHLIGHTS



100 chat piles and bases remediated



Over 4 million tons of mining waste and affected soils remediated



500,000 tons of chat made available for sale



Remediation of additional chat piles, chat bases and other mining features underway



The Catholic 40 property following cleanup.



Tribal- and State- led Cleanups



Cleanup work at the Catholic 40 property by the Quapaw Nation.

The Quapaw Nation and ODEQ leading cleanups under cooperative agreements with EPA



First Superfund site in nation where a tribe is leading site cleanup



The Quapaw Nation led cleanup of area with cultural and historical significance, known as the Catholic 40, which included the excavation, hauling and disposal of 107,000 tons of source material or chat.



AFTER

SITE CLEANUP MANAGEMENT, MILESTONES & PLANNING

EPA is the lead federal agency at the Site. EPA's Region 6 office, based in Dallas, Texas, oversees and coordinates the Site's cleanup. EPA works closely with federal, state and tribal partners to manage ongoing activities at the Site and to plan for future remedial activities.

The Site is divided into five operable units, or OUs. OUs represent distinct areas of a site, designated by EPA, to organize and manage complex cleanups. The table below

summarizes completed and ongoing actions for each OU.

OU1 *Surface Water/Groundwater*

OU2 *Residential Areas*

OU3 *Eagle-Picher Office Complex - Abandoned Mining Chemicals Removal Action*

OU4 *Chat Piles, Other Mine and Mill Waste, Smelter Wastes*

OU5 *Sediment and Surface Water*

Table 2. Superfund Cleanup Milestones: Status by Site OU

	OU1	OU2	OU3	OU4	OU5
Removal Action(s)		✓	✓		
No Further Action			✓		
Remedial Investigation	✓	✓	NA	✓	Underway
Feasibility Study	✓	✓	NA	✓	Underway
Remedy Decision Document	✓ (1984)	✓ (1997, 2007)	✓ (2000)	✓ (2008, 2010)	
Remedial Design / Remedial Action	✓	✓	NA	✓	
Remedial Action Completions (achieved incrementally)	Ongoing	Ongoing	NA	Ongoing	
Post-Construction Completion	Officially begins after plugging of all abandoned wells; O&M activities underway ²		NA		
Site Institutional Controls	NA	✓/Underway	NA	✓/Underway	
Site Reuse/ Redevelopment ¹	NA	Ongoing/ Planning underway	TBD	Ongoing/ Planning underway	

NA – not applicable

TBD – to be determined

¹ Residential, commercial and public uses continue on several properties that have been cleaned up. Reuses for properties currently undergoing cleanup are typically agricultural or rural. Chat processors also commercially process several major chat piles on the Site.

² ODEQ has assumed responsibility for O&M even though the remedial action is not yet complete.

The cleanup planning process for the Site is an ongoing effort by site partners to collectively provide input on the ongoing and future remedial actions and investigations at the Site's multiple OUs. EPA works closely with state, federal and tribal partners to implement site cleanup activities and plan for future investigations and remedial actions. Partner coordination takes many forms, including monthly staff meetings, conference calls, program manager meetings, annual stakeholder meetings, daily communications and other activities.

ODEQ and the Quapaw Nation work directly with EPA under cooperative agreements to oversee cleanup and related activities across different parts of the Site. EPA Region 6, the Quapaw Nation, ODEQ and the U.S. Department of the Interior's Bureau of Indian Affairs (BIA) meet monthly in Quapaw, Oklahoma, to share information and coordinate ongoing and planned cleanup actions for OU2, OU4 and OU5. BIA plays an important federal role at the Site because a large part of the Site is Indian-owned land held in trust by the U.S. Department of the Interior. In addition, chat sales, which is a major component of the OU4 remedy, is overseen by BIA when chat is owned by a tribal member. EPA and its site partners also work with other federal agencies, local governments, universities, and community groups.

Investigation and cleanup efforts at OU5 include seven watersheds covering 437 square miles and 119 river miles in Oklahoma, Kansas and Missouri. As a result, EPA Region 6 coordinates with EPA Region 7, based in Lenexa, Kansas, as well as

three state environmental offices, nine tribal environmental offices, other federal parties, universities and community groups to plan, implement and finalize site investigation, risk assessment and feasibility study actions. These coordination efforts include project meetings, conference calls and document sharing.

Because of the intensive site planning process and coordination required, site partners develop a priority list for remedial actions and investigations. EPA uses the priority list to plan for site work in upcoming fiscal years and determine funding needs for multi-fiscal year planning. EPA Region 6's goal is to keep a rolling priority list for a five-fiscal-year cycle. This rolling list allows Region 6 to identify additional site projects or work that can be started quickly if additional funding sources become available. Based on historical remedial action funding from EPA Headquarters for the Site, EPA Region 6 plans to receive and fund about \$15 million of remedial action work each fiscal year. Additionally, there is a limited amount of settlement funding (i.e., special account funds) for the Site paid to EPA by potentially responsible parties (mining companies) over the past several years. The special account funding can be used to fund site investigations and feasibility studies, remedial actions, five-year reviews, management assistance, remedial design and other site activities. The Region works diligently to balance funding priorities using remedial action funding, Superfund pipeline funding and special account funding.

Overview

OU1 addresses surface water degradation from the discharge of acid mine water and the threat of contamination of the Roubidoux Aquifer, the regional water supply, from downward migration of acid mine water from the overlying Boone Aquifer through abandoned wells. The 1984 OU1 Record of Decision (ROD) included use of diking and diversion structures to reduce the inflow of surface water to three mine shafts at the Site and reduce the outflow of acid mine water from the subsurface to Tar Creek. Construction activities finished in 1986. Currently, O&M annual inspections of the diversion channel and dike structures are performed by ODEQ.

Under the OU1 Roubidoux Aquifer groundwater monitoring program, abandoned wells that could threaten the Roubidoux Aquifer are still being discovered and plugged; while annual groundwater quality of four (4) Roubidoux wells continues to be monitored by ODEQ. The drinking water supplied from the Roubidoux Aquifer in the mining area continues to meet health-based primary drinking water standards (i.e., maximum contaminant levels, or MCLs) and is considered safe for use as a drinking water supply.



Completed Actions

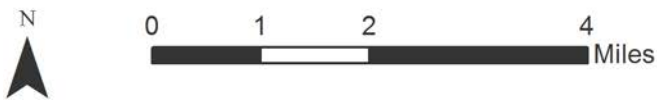
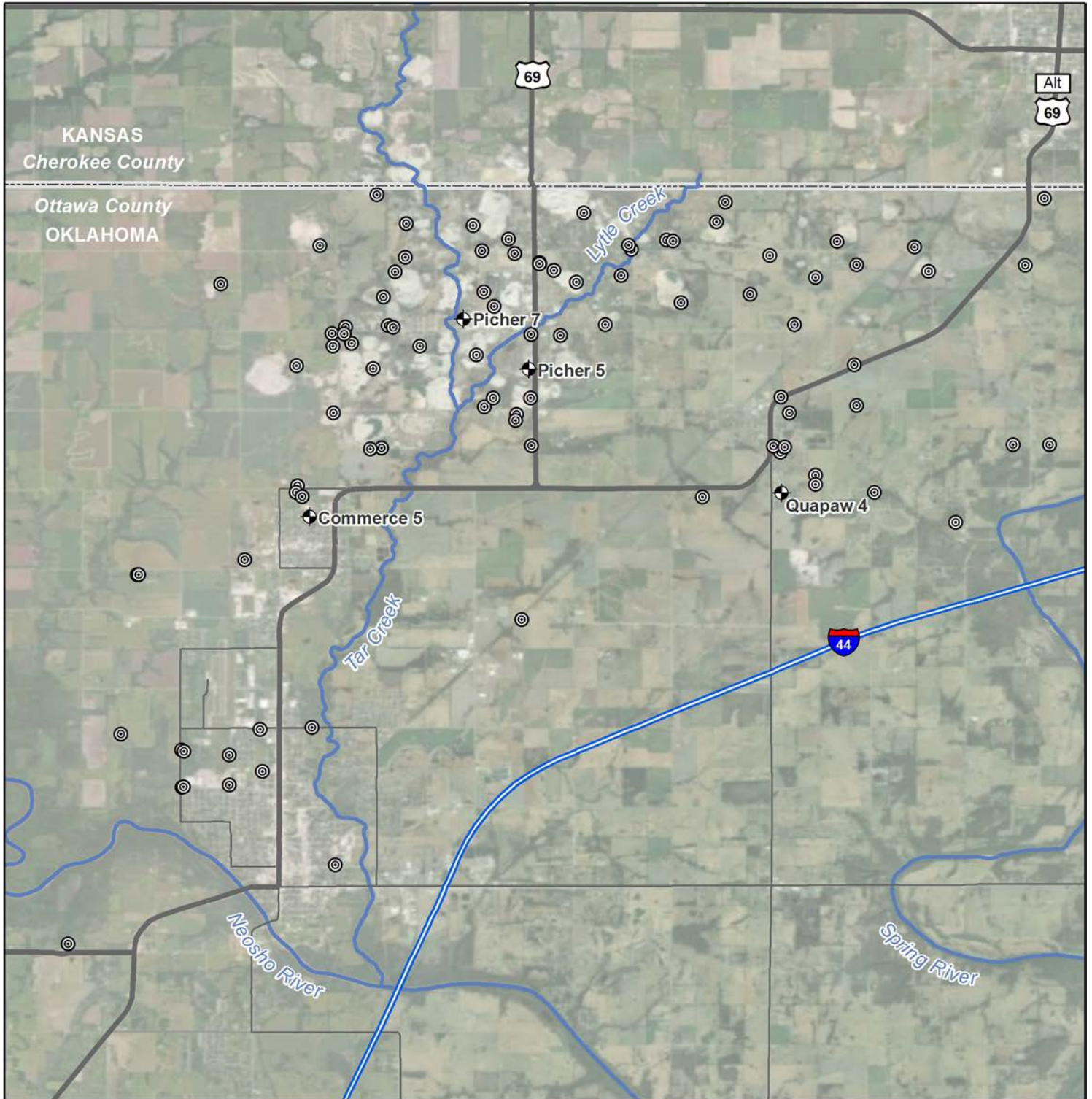
- Construction of dikes and diversion channels at three abandoned mine openings (identified as Muncie, Big John and Admiralty).
- Plugging of 83 abandoned wells in the deeper Roubidoux Aquifer.
- Start of groundwater monitoring in the Roubidoux Aquifer in 1987.



Planned Actions

- Continued plugging of abandoned Roubidoux Aquifer wells, if found.
- Continued operations and maintenance activities (i.e., annual Roubidoux Aquifer groundwater monitoring and inspections of the diversion and dike structures).
- Continued inspection and repair of dikes and diversion channels.

SURFACE WATER/GROUNDWATER



Legend

- ◆ Monitoring Wells
- ⊙ Plugged and Abandoned Wells

Sources: EPA Region 6, ODEQ, Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo and the GIS User Community.

Overview

OU₂ addresses contaminated soil in residential areas. Soil sampling in 1994 and 1995 found significant concentrations of lead in surface soils at residences and high-access areas such as daycare facilities, schoolyards and other areas where children congregate. In 1995, EPA began to excavate contaminated soil from these areas. EPA issued the OU₂ ROD in 1997 to address contaminated soil in OU₂ residential areas. ODEQ now oversees OU₂ and continues to address new properties that require investigation and remediation through a cooperative agreement with EPA. Anyone in Ottawa County is eligible for ODEQ's Residential Yard Cleanup Program.



Remediated area at a playground at Washington Elementary School.

The remediation of the yards and the public areas, and education and outreach programs implemented by the Ottawa County Health Department, are helping to protect children's health. Blood lead levels of Ottawa County children have been significantly reduced.



Completed Actions

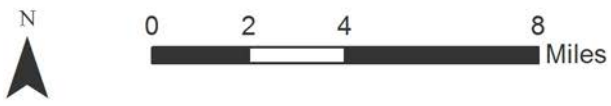
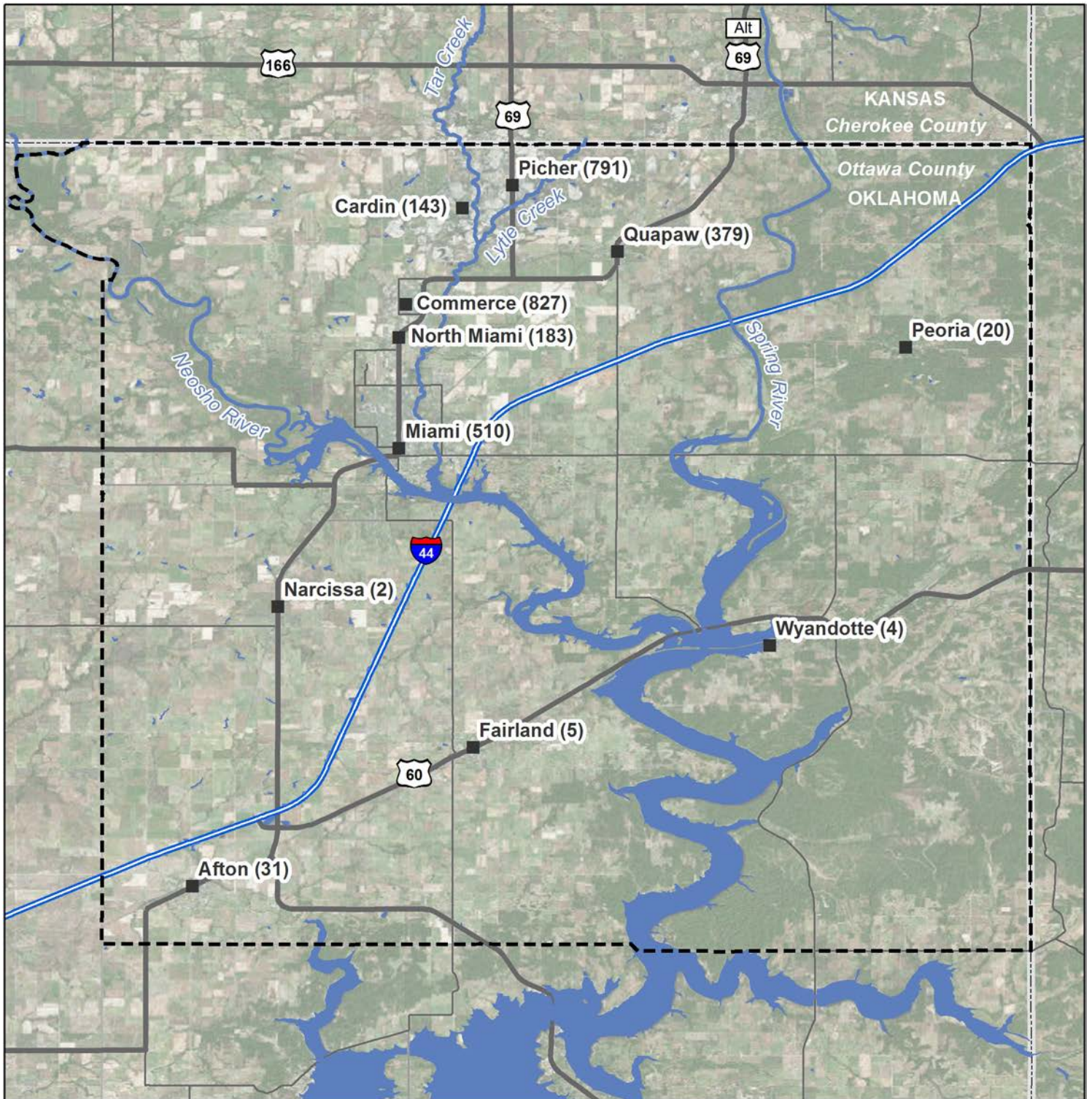
- Remediated 2,940 residential properties and high-access areas.
 - Residential yard remediation has been completed in the towns of Afton, Fairland, Narcissa, Peoria, Miami, Wyandotte, Picher, Quapaw, North Miami, Commerce and Cardin.
- Established a telephone hotline for Ottawa County residents to request soil sampling.



Planned Actions

- Continued ODEQ sampling of residential yards under a cooperative agreement with EPA.
- Continued ODEQ cleanup of residential yards under a cooperative agreement with EPA.
- Continued telephone hotline for Ottawa County residents to request soil sampling.

RESIDENTIAL AREAS



Legend

OU2 Boundary

Towns with remediation (number of remediated properties per town in parentheses; 45 properties elsewhere in Ottawa County)

Sources: EPA Region 6, Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo and the GIS User Community.

Overview

OU₃, the Eagle-Picher Office Complex, was a former office and laboratory facility in Cardin, Oklahoma, operated by one of the former mining companies. Many containers of chemicals were found at the Site in 1998 and 1999.



Staged drums at the Eagle-Picher complex.



Completed staging area at the Eagle-Picher complex.



Completed Actions

- Removed 120 containers of chemicals as part of a removal response action in 2000. No further action is necessary.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

3/2/2000

Am Tar Creek Superfund Site

MEMORANDUM

SUBJECT: Request for Approval of a Removal Action at the Eagle-Picher Office Complex - Abandoned Mining Chemicals Site, Cardin, Ottawa County, Oklahoma.

FROM: Gary W. Moore, Federal On-Scene Coordinator Response and Prevention Branch (6SF-R2)

THRU: Charles Gazda, Chief Response and Prevention Branch (6SF-R)

TO: Myron O. Knudson, P.E., Director Superfund Division (6SF)

I. PURPOSE

This memorandum requests approval for a Time-Critical Removal Action pursuant to Section 104(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 U.S.C. § 9604 (a), at the Eagle-Picher Office Complex - Abandoned Mining Chemicals Site (the "Site") located on approximately 8 acres in the area described as the "S1/2 SW 1/4 SE 1/4 of Section 19, T28N, R23E" of Ottawa County, Oklahoma near the city of Cardin. The Site is enclosed by a cyclone fence, and it lies west of the Northeast Oklahoma Railroad Right-of-Way. The response action will involve the removal and off-site disposal of hazardous substances and associated contaminated containers.

This action meets the criteria for initiating a removal action under the National Contingency Plan (NCP), 40 CFR § 300.415. This action is expected to require less than twelve months and less than two million dollars to complete.

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EPA Removal Action Memo.

EAGLE-PICHER OFFICE COMPLEX - ABANDONED MINING CHEMICALS REMOVAL ACTION



Building #15 at the Eagle-Picher complex.



Building #13 at the Eagle-Picher complex.

Overview

OU4 addresses undeveloped rural and urban areas of the Site where mining wastes (i.e., source material) are located. EPA issued the OU4 ROD in 2008, which called for a phased approach to address the mining waste over about 30 years. Although voluntary residential relocations are complete, cleanup efforts continue to address source material and transition-zone soil (soils around and underneath chat piles and bases). In 2014, EPA completed a Remedial Action Optimization Report to identify potential strategies and recommendations to help expedite the OU4 cleanup. As part of the Strategic Plan, EPA and its partners are considering additional opportunities to accelerate cleanup within OU4. Such opportunities may include, for example: considering the expansion of passive treatment wetlands to treat mine discharge water and address water quality and sediment contamination at the Site, and minimizing the excavation of chat haul roads and instead armoring them in place with limestone gravel.



Completed Actions

- Voluntary relocations of 628 residences, 74 businesses and 125 renters from impacted areas in Picher, Cardin and Hockerville, Oklahoma (completed in 2011), and Treece, Kansas (completed in 2012).
- Voluntary buyout and relocation of a family residing at the former smelter site (completed in 2019).
- Remediation of rural residential yards not included in OU2.
- Initiation of cleanup of source materials, including a former lead smelter, chat piles and chat bases. About 100 chat piles and chat bases have been remediated.
- Construction of the Central Mill Repository at a former fine tailings pond.
- Development of new ecological preliminary remediation goals based on site-specific data used to define original OU4 ROD remediation goals, with the goal of reducing the amount of topsoil taken to the repository for disposal and reducing remedial action costs.
- Provision of rural drinking water connections to three homes after high levels of lead were found in their water wells.
- Removal of more than 4 million tons of mining wastes from restricted and unrestricted properties, now managed at the Central Mill Repository or deposited back into the mine workings.¹
- Construction and successful ongoing treatment of mine water discharges, using passive treatment systems at the Mayer Ranch in Commerce, Oklahoma, and in southeast Commerce, managed by ODEQ.

¹ Tribal land or property at the Site may be restricted or unrestricted. Restricted land is held by a tribe or tribal member subject to restriction (e.g., against sale or transfer). Fee simple (i.e., unrestricted) land or property is held by a tribe, tribal member or non-tribal member without restriction.

CHAT PILES, OTHER MINE & MILL WASTE, & SMELTER WASTES

- Support for chat sales.² Over 500,000 tons of chat have been provided to local chat processors, during remedial actions, to be sold. Additional chat sales associated with restricted tribal lands are administered by BIA, including additional chat sold directly by chat processors.
- Completion of several ODEQ-led cleanups, including Distal 6a and Beaver Creek Tier 1 under cooperative agreements with the EPA.
- Completion of several Quapaw Nation-led cleanups, including the Catholic 40 site (Distal 8), Distal 7 North (Drainage Feature), Chat Base 060, Distal 13 and Distal 10/12 under cooperative agreements with EPA.
- Initiation of soil amendment pilot studies to evaluate how to preserve topsoil and make metals less bioavailable.
- Completed inspections of approximately 17 end users of chat to determine compliance with the Chat Rule.³

Voluntary Buyouts

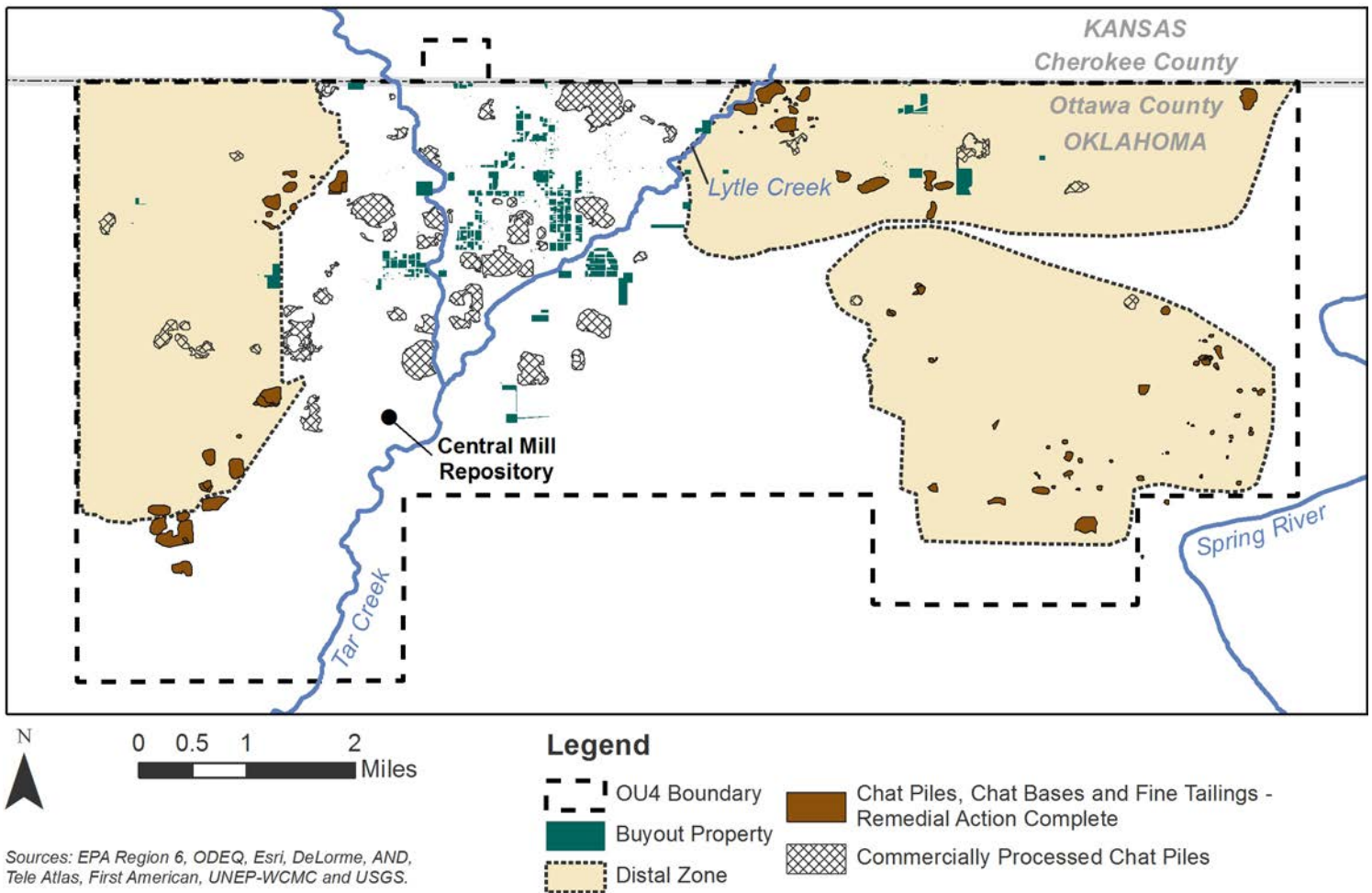
The Lead Impacted Communities Relocation Assistance Trust and Treece Relocation Assistance (buyout trusts) offered residents of the most heavily-impacted mining communities (Picher, Cardin and Hockerville, Oklahoma, and Treece, Kansas) the opportunity to relocate.

The buyout trusts purchased and/or demolished structures to decrease the health risks and liability associated with homes and businesses located nearest mining waste areas. ODEQ placed deed notices on residential properties in Oklahoma to prohibit future residential use of the properties. Like the Oklahoma buyouts, EPA Region 6 also worked with the Kansas Department of Health and Environment to buy out residences in Treece, Kansas, that were exposed to site contamination.

The voluntary buyouts removed most of the residents from the most-impacted areas at the Site, reducing the risk of exposure to site contaminants and allowing for more time to implement the OU4 remedy.

² EPA does not own any chat and will not purchase any chat. However, it is assisting chat sale participants, including the Quapaw Nation and local chat processors, as part of the Site's Superfund remedy.

³ All site chat that is used, on site or off site, must be managed according to the OU4 ROD Section 19.2 or the criteria provided in the Chat Rule, 40 CFR 278, and its preamble.



Organization of OU4's Core Mining & Distal Area Cleanup

OU4 consists of two main areas:

- **Core mining areas** – where the largest chat and fines deposits are located.
- **Distal areas** – where the population is sparse and the chat piles are smaller and generally dispersed. There are three main distal areas:
 - Northeast Distal Area
 - Southeast Distal Area
 - Elm Creek Distal Area

Each distal area has distal groups containing chat piles, chat bases and fine tailings ponds. There are 16 distal groups.

The Central Mill Repository, constructed in 2010, is the final storage location for waste from the distal group remediation.

CHAT PILES, OTHER MINE & MILL WASTE, & SMELTER WASTES



Planned Actions

- Continue to collaborate with the Quapaw Nation and ODEQ (site partners) and other stakeholders to effectively prioritize the remediation of source material near riparian areas to reduce metals loading to Tar Creek, Lytle Creek, Beaver Creek and Hockerville/Ontario Creek.
- Continue cleanup of remaining chat piles, chat bases and fine tailings deposits through cooperative agreements with the Quapaw Nation and ODEQ.
- Continue cleanup of transition-zone soil contamination.
- Complete the remedial design for the Core Area and plan for interim remedial action. The Core Area is the part of the Site with the greatest concentration of chat piles and bases along Tar Creek and Lytle Creek, which contributes significant metals loading to surface water.
- Continue bioaccumulation studies on row crops (i.e., winter wheat, corn, soybeans, and pasture grasses) to confirm that OU4 ROD remediation goals for cadmium, lead and zinc and proposed ecological-based preliminary remediation goals for cadmium and zinc yield EPA-acceptable risks for crop consumers and consumers of milk and beef from grazing beef and dairy cattle.
- Continue to evaluate the “moving window approach” – used to define remediation areas for ecological receptors – as a tool to help reduce soil excavation volumes and remedial action costs.
- Continue to inventory and map ongoing, completed and planned remediation areas to facilitate the prioritization of remedial actions.
- Continue to assess various options for reducing the amount of topsoil taken to the repository and also for reducing the costs of the remedial actions.
- Continue to develop preliminary remediation goals, based on site-specific data, since anticipated land uses have changed since the 2008 mining waste ROD (OU4).
- Issue an amendment to the mining waste ROD (OU4) in 2020.
- Continue to provide technical support to the Quapaw Nation and ODEQ during the implementation of the remedial action for OU4.
- Continue cleanup of residential yards not addressed under OU2, as needed.
- Perform general maintenance at the Central Mill Repository, including collaborating with ODEQ and Quapaw Nation (site partners) on the redesign of the repository in an effort to reduce operations and maintenance costs to be funded by ODEQ after closure. Repository redesign to be completed by 2021.
- Continue to assess three areas where soil amendments have been applied with the objective of reducing the bioavailability of cadmium, lead and zinc to reduce the amount of topsoil taken to the repository for disposal and remediation costs.
- Continue support for chat sales.
- Identify end-users and develop an end-user inventory and strategy to determine compliance with the Chat Rule.
- Continue ODEQ operation of the Mayer Ranch and Southeast Commerce passive treatment systems.
- Continue community involvement activities led by the Quapaw Nation and ODEQ according to their respective cooperative agreement requirements, with support from EPA. Activities include development and dissemination of brochures and fact sheets, and participation in the annual Tar Creek Conference, fairs and open houses.

Overview

OU5 addresses sediment and surface water and includes seven watersheds covering about 437 square miles and 119 river miles in Oklahoma, Kansas, Missouri and nine tribal areas. EPA Region 6 is coordinating efforts to characterize sediment and surface water throughout the lower Spring and Neosho River basins and potential risks to human and ecological health with EPA Region 7, three states (Oklahoma, Missouri and Kansas), nine tribes (Quapaw Nation, Peoria Tribe, Ottawa Tribe, Miami Tribe, Eastern Shawnee Tribe, Wyandotte Nation, Seneca-Cayuga Nation, Modoc Tribe and Cherokee Nation), and the community.



Completed Actions

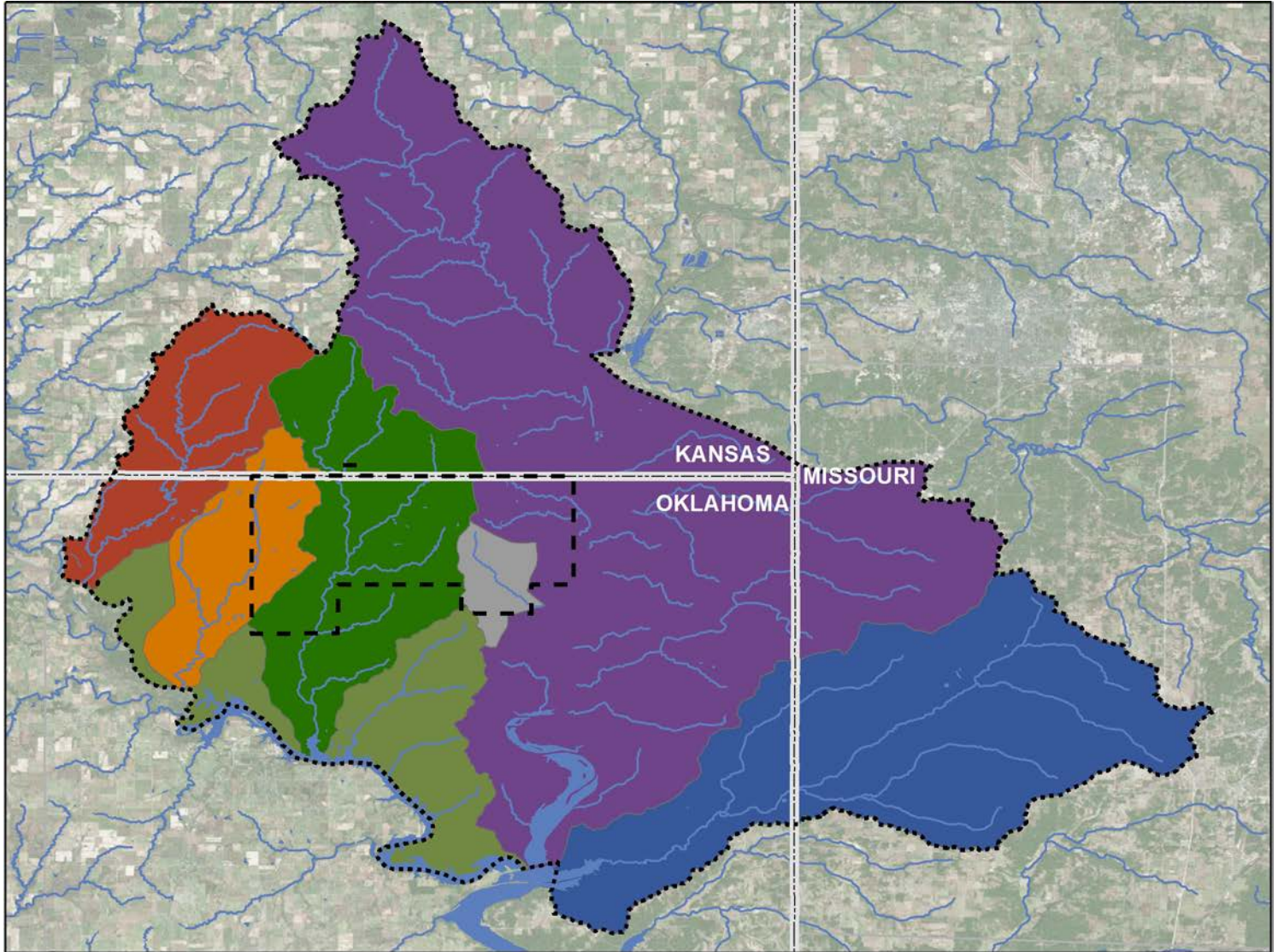
- Initiated remedial investigation and human health risk assessment.
- Developed data review, data gap identification and human health exposure scenarios.
- Developed the draft final and final Data Gap Report.
- Developed the final Field Sample Plan and Quality Assurance Project Plan.
- Conducted field sampling to collect data to fill identified data gaps.
- Initiated feasibility study to identify and evaluate potential remediation technologies.



Planned Actions

- Completion of remedial investigation, human health risk assessment and feasibility study.
- Preparation of proposed plan.
- Issue watersheds ROD.

SEDIMENT & SURFACE WATER



Sources: EPA Region 6, Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo and the GIS User Community.

Legend

- OU4 Boundary
- OU5 Boundary
- OU5 Watersheds**
 - Beaver Creek Watershed
 - Elm Creek Watershed
 - Fourmile Creek Watershed
 - Neosho River Watershed
 - Lost Creek Watershed
 - Tar Creek Watershed
 - Lower Spring River Watershed

INSTITUTIONAL CONTROLS

Overview

Institutional controls are non-engineered instruments such as administrative and legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. Institutional controls that have been implemented or are in place for the Site include:

- **Informational controls** such as childhood lead poisoning prevention education programming.
- **Governmental controls** such as state regulations requiring special protective well construction for wells to seal off the Boone Aquifer in order to protect the Roubidoux Aquifer, and toxic metals testing and possible treatment for Boone wells used for potable or domestic purposes.
- **Proprietary controls** in the form of deed notices and easements that limit how various properties can be used that do not support unrestricted use and unlimited exposures.

ODEQ and the Ottawa County Health Department, in conjunction with the Oklahoma State Department of Health, have implemented a variety of institutional controls. ODEQ placed deed notices and easements on properties acquired via the OU4 buyouts. ODEQ establishes deed notices and easements in areas under state jurisdiction where source materials are covered on site.

There are currently some tribal properties where remedial action has been completed but the waste was covered and left in place, which lack institutional controls. To address the need for institutional controls on these properties, EPA identified the Site on the Superfund Task Force List of “Superfund Sites Targeted for Immediate, Intense Action” in July 2018.

One of the objectives identified is to develop and institute a short-term and long-term strategy with BIA and the Quapaw Nation to implement institutional controls to protect cleanup and ensure long-term stewardship. Indian-owned property is managed by the U.S. Department of the Interior as trustee.

Over the past year, the short-term strategy for institutional controls on tribal properties has been developed and implemented. The first conservation easement restricting land use on a remediated Indian-owned property was recorded with the BIA Land, Title and Records Office on December 7, 2018. This marks the first time where BIA, in partnership with EPA and a tribal nation, has recorded land use restrictions on tribal restricted property at a Superfund site. In the long term, the Quapaw Nation is seeking the authority to directly implement land use controls on tribal trust and restricted properties. In 2019, BIA, the Quapaw Nation and EPA will work together on recording conservation easements at three other Indian-owned properties at the Site.

Table 3. Institutional Controls (ICs) in Place or Planned

<i>Location/Area IC Applied</i>	<i>IC Objective</i>	<i>IC Instrument</i>	<i>Responsible Organization</i>	<i>Current Status</i>
Covered mining waste	Restrict future use of the property to protect the cover.	Deed Notice and Easement	ODEQ EPA Quapaw Nation and BIA ¹	Ongoing
On-site repositories	Restrict future use of the property to protect the engineered containment system.	Deed Notice and Easement	ODEQ EPA	Deed notices filed on three subsidence area repositories, one consolidation area and the Central Mill Repository
Property acquired via voluntary relocation	Restrict future use of the property to prevent human exposure to contamination.	Deed Notice and Easement	ODEQ Controls in effect until area is safe for reuse	Deed notices have been filed
Shallow groundwater	Protect the integrity of the Roubidoux Aquifer and ensure Boone Aquifer wells for domestic and potable use do not exceed MCLs for toxic metals.	Oklahoma Water Quality Standard	ODEQ	In place

¹ For property where the U.S. Department of the Interior is the trustee, institutional controls are being developed by the Quapaw Nation and recorded by BIA as appropriate.

Examples of Informational Institutional Controls Used at the Site

- Fact sheets about the safe use of mine tailings
- Childhood lead poisoning prevention/lead-contaminated dust reduction education through health fairs, Head Start and child care programs, community organization and events
- Blood-lead screenings
- ODEQ fish consumption advisories for Tar Creek area water bodies

SITE REDEVELOPMENT & CONTINUED USE

Overview

The revitalization of places affected by contaminated lands is a key part of the Superfund program's mission. Today, land uses at the Site include agriculture, residential, light industry and commercial uses. A large part of the Site is now being used for row crop production and pasture land for cattle. Mining-related activities in the form of chat processing is also ongoing at the Site.

In coordination with EPA, ODEQ, the Quapaw Nation and BIA, chat processors commercially process several major chat piles on site. Processing operations support local jobs and provide employee income. This income injects money into local economies and generates revenue. Processing operations also help local economies through direct purchases of local supplies and services. Currently, processing is underway at the Pioneer, Sooner, Admiralty, Blue Goose, Kenoyer, Lawyers, Rialto and Ottawa chat piles. Processing of the Skelton chat pile is about to start. As part of the Strategic Plan, EPA and its partners are considering opportunities for increasing the marketability of chat.

The Quapaw Nation is also exploring different uses for parts of the Site. For example, the Quapaw Nation-led cleanup of the Catholic 40 site resulted in protection of historic structures, artifacts and landscape features of cultural significance to the Quapaw Nation that are now accessible for archaeological research and education opportunities. It is EPA's understanding that the Catholic 40 site

may be developed for tourism based on the cultural significance of the area to the Quapaw Nation. In addition, the Quapaw Nation and the Grand River Dam Authority, with support from EPA, are partnering on a solar assessment to evaluate the potential for siting renewable energy facilities on tribal land, including the Bird Dog area. Other new uses under consideration include greenspace and a splash park.

Cleanup efforts will continue to make other areas of the Site available for reuse. So far, cleanup efforts have helped make over 800 acres of private and tribal lands previously overlain by chat piles/bases and fine tailings available for future reuse. In addition, over 3,800 contiguous acres (including areas surrounding the nearby cleaned up chat piles/bases and fine tailings), are available for reuse which otherwise might not have been available for reuse if not for the remedial action. As part of the Strategic Plan, EPA and its partners are considering opportunities to accelerate reuse of areas that achieve cleanup goals.



Before-and-after views of the cleanup of the Distal 10 area, now in use for agricultural purposes.

COMMUNITY INVOLVEMENT

Overview

EPA and its partners value input from affected communities and are fully committed to working with local communities throughout the cleanup process. EPA and its partners support and participate in a wide-range of community initiatives that inform residents about the Site and involve them in the cleanup decision-making process. These include regular meetings with local stakeholders, the annual Tar Creek Conference, community open houses and health fairs, document and data sharing, and site fact sheets and updates provided through mail or on EPA (www.epa.gov/superfund/tar-creek) and ODEQ (www.deq.state.ok.us/lpdnew/TarCreekindex.html) site web pages. EPA and its site partners work hard to get information about the Site out and to involve area communities.

EPA also facilitates greater community involvement in site-related decisions and discussions by making technical assistance services available, in close coordination with the Local Environmental Action Demanded (L.E.A.D.) Agency, a nonprofit organization that promotes awareness of health and environmental issues related to the Site. This has included awarding the L.E.A.D. Agency a Technical Assistance Grant (TAG) and, more recently, making technical assistance services available to the community through EPA's Technical Assistance Services for Communities program.¹

¹ A TAG provides funding to community groups to contract their own technical advisor to interpret and explain technical reports, site conditions and EPA's proposed cleanup proposals and decisions. EPA's TASC program provides independent technical assistance through an EPA contract.

² EPA's SuperJTI is an environmental remediation job readiness program that provides career development opportunities for residences living near Superfund sites. EPA's goal is to help provide training and employment opportunities for people living in communities affected by Superfund sites during the cleanup and redevelopment process, and to provide the workforce development skills needed to take advantage of those opportunities.



SuperJTI graduation in 2010.

In 2010, EPA also supported a local Superfund Job Training Initiative (SuperJTI) in coordination with L.E.A.D. Agency. The SuperJTI students attended Northeast Technology Center at Afton, Oklahoma for training.²

Examples of ODEQ-Coordinated Site Information Materials

- OU2 Yard Cleanup Fact Sheet
- Blood Lead Fact Sheet
- OU2 Remedial Action Yard Maintenance Information Brochure
- OU4 Source Material Fact Sheet
- OU Identification Card
- Sign Up Sheets for OU2 Yard sampling
- OU2 Sample Hotline Number Business Cards and Magnets

NEAR-TERM STRATEGIC PLAN

Overview

The Near-Term Strategic Plan (2019-2021) describes the site investigation and cleanup actions and related near-term support planned for the next three years, project leads, funding amounts and sources, and target completion dates, where applicable. Key, overarching near-term actions are presented first, followed by additional, near-term planned actions for specific OUs.

Key Near-Term Actions

Enact Conservation Easements on Tribal Land.

The first conservation easement restricting land use on a remediated Indian-owned property was recorded with the BIA Land, Title and Records Office in 2018. In 2019, BIA, Quapaw Nation and EPA will work together on recording conservation easements at three other Indian-owned properties.

Establish Quapaw Nation Land Use Control Authority.

The Quapaw Nation plans to work with the U.S. Department of the Interior to establish the authority to directly implement land use controls on tribal trust and restricted properties. In August 2018, the Quapaw Nation and the U.S. Department of the Interior agreed to work together to draft language to amend

CFR Title 25 to provide land use control authority to the Quapaw Nation. EPA will work with the U.S. Department of the Interior and the Quapaw Nation to support this rulemaking. In the interim, the Quapaw Nation is working through the BIA process to implement institutional controls on restricted properties that have already been remediated. By ensuring that there are institutional controls in place on remediated tribal lands, more site areas could be considered for deletion from the NPL, accelerating site reuse. This work is currently underway and anticipated to be completed in 2021.

Complete Partial NPL Deletions.

At many Superfund sites, EPA's deletion process starts after the entire cleanup is finished. However, waiting to delete an entire site, especially very large sites, means that the successful cleanup of portions of a site may not be communicated, which can negatively impact opportunities for beneficial reuse. For large sites such as the Tar Creek Superfund Site, it will be several decades before the entire site qualifies for deletion from the NPL. EPA's solution is to consider using the partial deletion process. EPA can delete portions of NPL sites, provided that deletion criteria are met. EPA and its partners are discussing a phased approach to cleanups that could allow for portions of the Site to be considered for partial deletion, especially for tribal land. There are already a few geographic areas of the site under consideration, including cleaned-up residential areas, the Eagle-Picher Office

Complex (OU3), and concentrated parcels of remediated areas in the Southeast, Northeast and Elm Creek Distal Zones. Ideally, large remediated contiguous areas would be considered for partial deletions. EPA anticipates deleting 5,000 acres from the NPL by 2021.

Continue Site Cleanup Progress.

Efforts to control ongoing releases across the Site continue, primarily within OU1 and OU4. In addition, cleanup of chat piles is continuing. Cleanup of Beaver Creek chat piles will be completed in 2019. Cleanup of Elm Creek chat piles will begin in 2020 and be completed in 2022.

Issue New Decision Documents.

EPA and its site partners will soon issue new decision documents to address site cleanup. EPA will issue an amendment to the mining waste ROD (OU4) in 2020. See “Planned Actions for OU4” for additional information about the mining waste (OU4) ROD amendment. EPA will issue a ROD for the Site’s watersheds (OU5) in 2021. See “Planned Actions for OU5” for additional information about the watersheds ROD (OU5).



Cleanup of Chat Pile CP009.

Key Near-Term Actions

- Enact Conservation Easements on Tribal Land.
- Establish Quapaw Nation Land Use Control Authority.
- Complete Partial NPL Deletions.
- Continue Site Cleanup Progress.
- Issue New Decision Documents.

NEAR-TERM STRATEGIC PLAN

Additional Near-Term Actions

Planned Actions for OU1 – Surface Water/Groundwater

For the foreseeable future, OU1 will require continued plugging of abandoned wells, groundwater monitoring and inspection and maintenance of dikes and diversion channels to protect drinking water and surface water. ODEQ will fund any required future O&M activities related to the dike and diversion structures and identify for EPA's consideration additional wells that require closure.



OU1 O&M activities include repairing dike collapses, as shown above.

Planned Actions for OU2 – Residential Areas

OU2 actions will remain ongoing via EPA-funded cooperative agreements with ODEQ. In each of the upcoming fiscal years (FYs) through FY2023, ODEQ will receive funding to sample and remediate residential and high-access areas in Ottawa County as they are identified. EPA plans to provide ODEQ with approximately \$550,000 in funding per fiscal year to perform the necessary investigations in residential and high-access areas with potential site contamination. The results from those investigations will determine which areas need to be cleaned up. The funds for the ODEQ-led investigations will likely use Tar Creek special account funds. In addition, EPA plans to provide ODEQ with approximately \$600,000 in funding each fiscal year through FY2023 to perform the necessary cleanups. The funds to perform the cleanup actions will likely come from EPA remedial action funds.



Ongoing OU2 actions include sampling high-access areas such as this church parking lot.

Table 4. Tar Creek Site Cleanup Actions Completed and Near-Term Targets (OU2 & OU4)

	Total Completed	Total Remaining ¹	Total Target Completion ²				
			2019	2020	2021	2022 ³	2023 ³
<i>Chat piles</i>	31	74	4	2	3	5	3
<i>Chat bases</i>	69	174	5	4	6	2	TBD
<i>Fine tailings deposits</i>	3	60	5	5	5	5	TBD
<i>Residential yards/ high-access areas</i>	2,940	TBD	TBD	TBD	TBD	TBD	TBD
<i>Plugging of abandoned wells</i>	83	Unknown	TBD	TBD	TBD	TBD	TBD
<i>Rural water connections for private residences</i>	3	0	NA	NA	NA	NA	NA
<i>Relocation</i>	629 residences, 74 businesses and 125 renters	0	NA	NA	NA	NA	NA

¹ Figures are approximate.

² The remedial actions for the same chat piles/bases and fine tailings deposits may carry over each year due to the amount of chat needed to be remediated.

³ In 2022 and 2023 work is planned to begin in the Core Area of the Site. This remedial action will only involve an interim action, and only a minimal amount of chat will be removed from the Site for disposal.

Planned Actions for OU4 – Chat Piles, Other Mine and Mill Waste, Smelter Wastes

Revise Remediation Strategies and Issue Mining Waste ROD Amendment (OU4).

Current site cleanup practices focus on removal and hauling of chat and impacted soils from each discrete mine waste area. When appropriate and based on future land use, in-place consolidation and containment (i.e., capping) saves time and money. Other remediation strategies worth considering for future cleanup work at the Site include:

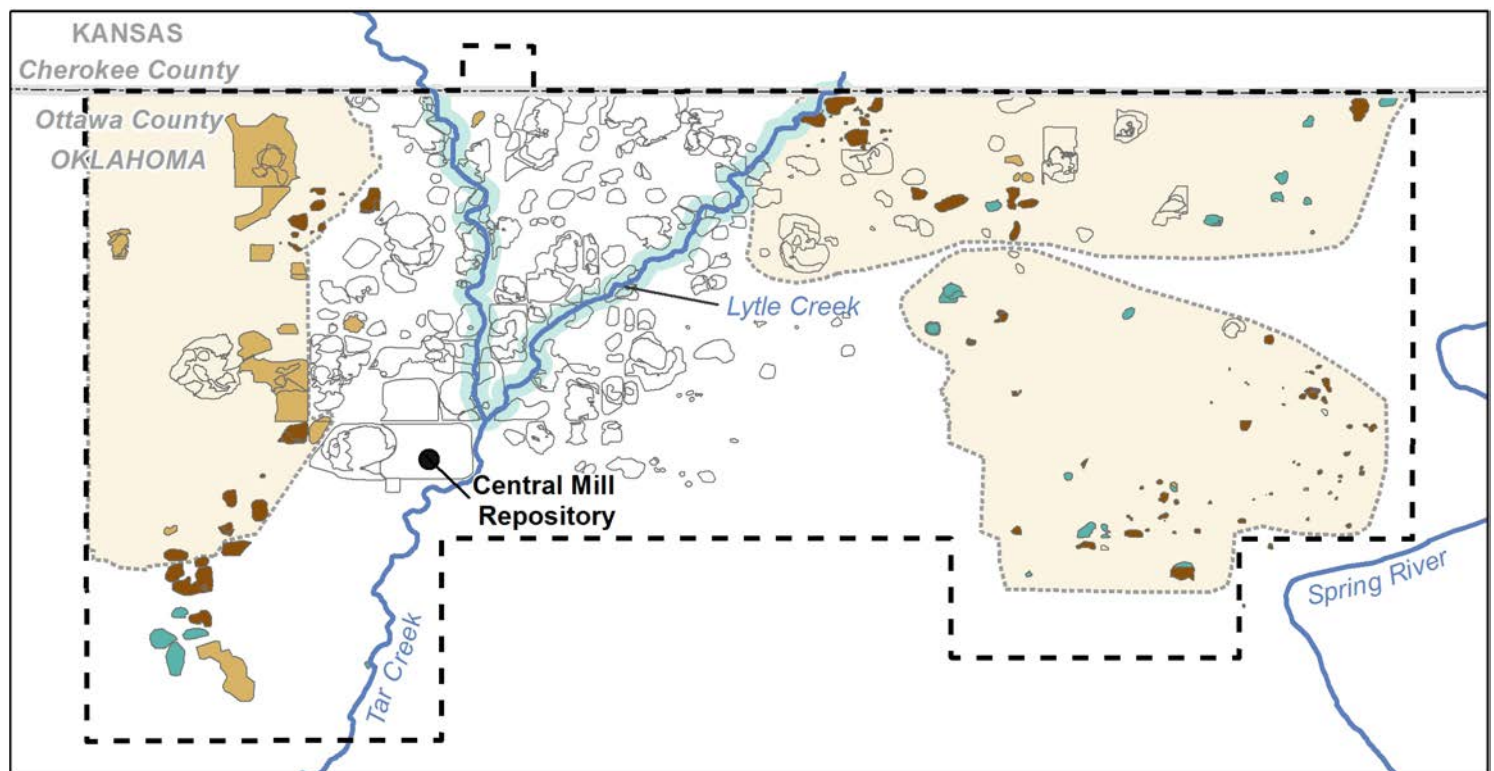
- Allowing the importation of top soil.
- Minimizing the excavation of chat haul roads and instead armoring them in place with limestone gravel.
- Working with the U.S. Army Corp of Engineers to design a way to effectively use abandoned mine shafts and subsidence features for placement of source materials.
- Reducing the footprint of contamination, the risk of human and ecological exposure, and the risk of open unrestricted holes, by encouraging the use of chat injection by chat processors.
- Considering the expansion of passive treatment wetlands to treat mine discharge water and address water quality and sediment contamination at the Site.

NEAR-TERM STRATEGIC PLAN

As part of this EPA plans to amend the mining waste (OU4) ROD. The mining waste amendment will be required for a change in the remediation goals for the Site due to the development of site-specific data and a change in land use assumptions (i.e., row crop production and pasture land). Additionally, other items (e.g., backfill, consolidation and capping) would all require an amendment.

Fund Remedial Actions by the Quapaw Nation and ODEQ.

EPA plans to provide approximately \$15 million each fiscal year over the next five years for allocation between the Quapaw Nation and ODEQ for the implementation of OU4 remedial actions under EPA cooperative agreements. The planned remedial actions, on restricted and unrestricted properties, will be prioritized based on the source materials' proximity to the riparian areas of Tar Creek, Lytle Creek, Beaver Creek and Hockerville/Ontario Creek, including prioritization based on a child with high blood lead levels.



Legend

- OU4 Boundary
- Distal Zone
- Core Area Planned for Interim Remedial Action

Chat Bases, Chat Piles and Fine Tailings - Remedial Action Status

- Complete
- In Progress
- Planned for Next 5 Years
- Future Remedial Action Needs, but Not Prioritized (>2023)

Sources: EPA Region 6, ODEQ, Esri, DeLorme, AND, Tele Atlas, First American, UNEP-WCMC and USGS.



Chat piles at the Tar Creek Superfund Site.

For the Quapaw Nation, these remedial actions will include:

- Remediation of marketable chat piles, which will expedite chat sales for tribal restricted properties.
- Implementation of a remedial action (i.e., possible consolidation and capping of source material) at the Bird Dog restricted property, including Distal 10a located downstream of this area, to facilitate the possible construction of a solar farm in coordination with the Quapaw Nation and the Grand River Dam Authority.
- Implementation of interim remedial actions at the Core Area of the Site for restricted properties (i.e., the site area with the greatest concentration of chat piles/bases along Tar Creek and Lytle Creek).

For ODEQ, these remedial actions will include the remediation of chat piles/bases along the riparian areas of Elm Creek and Hockerville/Ontario Creek. Discussions are ongoing for the implementation of additional remedial actions for the source material located next to the riparian areas of Beaver Creek, including the implementation of interim remedial actions at the Core Area of the Site for unrestricted properties. The Quapaw Nation will perform the construction of the remedial actions through inter-agency agreements with ODEQ.

NEAR-TERM STRATEGIC PLAN

The planned remedial actions within the next five years by the Quapaw Nation and ODEQ are expected to significantly reduce the metals loading to Tar Creek, Lytle Creek, Beaver Creek, Elm Creek and Hockerville/Ontario Creek.

Provide Technical Support for Ongoing and Planned Remedial Actions.

EPA plans to provide about \$1.2 to \$2 million in funding each fiscal year from the Site's Special Account to provide

Near-Term Actions for OU4

- Continue Site Cleanup Progress.
- Revise Remediation Strategies and Issue Mining Waste ROD Amendment.
- Fund Remedial Actions by the Quapaw Nation and ODEQ.
- Provide Technical Support for Ongoing and Planned Remedial Actions.
- Ensure Chat is Used in a Safe and Appropriate Manner.
- Support Sixth Five-Year Review and Management Assistance.
- Collaborate with Stakeholders.

technical support to the Quapaw Nation and ODEQ during the implementation of the ongoing and planned remedial actions at the Site under cooperative agreements with EPA. EPA also plans to continue funding technical projects to evaluate options to reduce the amount of topsoil taken to the Site's repository and reduce remediation costs. Topsoil is a valuable resource at the Site and some areas of the Site consist of shallow bedrock where it is not practicable to remove contaminated soil with concentrations of metals above OU4 remediation goals. With funding from the Site's Special Account, EPA also plans to provide \$300,000 for the completion of the remedial design for the Core Area of the Site and \$500,000 for the redesign of the Central Repository. Discussions are ongoing for the redesign to include a western expansion of the repository on tribal fee land (land owned in fee by the Quapaw Nation; the U.S. Department of the Interior is not the trustee for fee-owned land). The implementation of the remedial actions under OU4 requires that EPA determine compliance with the Chat Rule. EPA plans to allocate approximately \$100,000 each fiscal year from the Site's special account to determine compliance with these rules by the end user of the chat.

Ensure Safe and Appropriate Uses of Chat.

EPA is committed to working with chat processors as well as other end-users to ensure the safe and appropriate use of chat

from the Site. In the years since issuing the 2008 OU4 ROD, EPA Region 6 has hosted multiple compliance assistance workshops for all chat processors in Ottawa County. EPA's goal is to ensure that processors and end-users are familiar with the rules and regulations pertaining to safe and

appropriate use of chat from Tar Creek. EPA Region 6 will continue to work with our chat sales partners, including chat processors, BIA, ODEQ and EPA Region 7, to ensure the protective use of chat as part of the OU4 remedy.

Near-Term Strategic Plan Priorities as Identified by EPA's Partners¹

ODEQ Priorities

- Funding for OU2 Residential Yard Investigations and Cleanups.
- Continue OU1 O&M.
- Funding for OU4 Elm, Hockerville, Ontario and Beaver Creek Remedial Actions.
- Sixth Five-Year Review.
- Partial Deletions.
- Revise Cleanup Levels for Lead Based on Land Use.
- Expand Use of Passive Treatment Wetlands.
- Develop Strategy for Subsidence Areas and Shaft Closures.
- Continue OU2 Blood Lead Reporting.
- Revise Cleanup Levels for Cadmium and Zinc based on Site-Specific Ecological Risk.

Quapaw Nation Priorities

- Funding for OU4 Bird Dog, Distal 10a, Distal 9.
- Establish Direct Tribal Land Use Control Authority.
- Partial Deletions.
- Revise Cleanup Levels for Lead based on Land Use.
- Solar Assessment Leading to Solar Installation Development of Tribal Land.
- Consolidate Chat Ownership and Improve Marketability of Chat.
- Use Engineered Structure(s), in Combination with Constructed Wetlands, to Control the Mine Pool Elevation and thereby Address Surface Mine Discharge at Douthat Bridge.

¹ Lists are not comprehensive and subject to change.

NEAR-TERM STRATEGIC PLAN

Support Sixth Five-Year Review and Management Assistance.

EPA plans to use funding from the Site's special account to provide approximately \$130,000 for the development of the Site's sixth Five-Year Review, due by September 2020. Over the next five years, EPA also plans to use special account funding to provide \$400,000 for state and tribal management assistance.

Collaborate with Stakeholders.

EPA will continue to collaborate with the Quapaw Nation, ODEQ and other stakeholders to effectively prioritize the remediation of source material near riparian areas to reduce metals loading to Tar Creek, Lytle Creek, Beaver Creek and Hockerville/Ontario Creek. This collaboration will occur through regular communication with all stakeholders (e.g., monthly meetings) and agreements with all aspects, including priorities, of the remedial actions for OU2 and OU4.

Planned Actions for OU5 – Sediment and Surface Water

OU5 remedial design will begin after EPA completes the remedial investigation/feasibility study and issues the watershed's ROD (OU5). EPA and its partners will continue investigation, human health risk assessment activities and the feasibility study. Coordination will continue through periodic meetings, conference calls and document sharing.

Complete the Remedial Investigation and Human Health Risk Assessment.

An investigation of sediment and surface water impacted by mining is ongoing, focusing on the impacts of historical mine releases on sediment, surface water and human health. EPA Region 6, in coordination with EPA Region 7, is implementing the remedial investigation and human health risk assessment.

Continue Coordination with Tribes, States, the Community and Other Federal Agencies.

EPA Regions 6 and 7 coordinate with nine tribes, three states, other federal agencies and local communities to discuss, plan, develop and implement remedial investigation, human health risk assessment and feasibility study processes. Consistency across the seven watersheds, 437 square miles and 119 river miles is maintained through email, periodic project progress meetings, participation during the annual Tar Creek Conference, participation during the Tri-State Trustee Meeting, document sharing and review, and conference calls. These efforts provide updates, discussion and input opportunities throughout each step of the project.

Complete the Feasibility Study and Associated Treatability Studies.

EPA Region 7, in coordination with EPA Region 6, will complete the feasibility study. The feasibility study focuses on the review and implementation of potential technologies and remedial actions that

will address sediment and surface water impacted by historical mine waste releases that may adversely affect human health and the environment. EPA is committed to evaluating a variety of potential technologies to address contamination. These potential technologies may include sediment traps, sediment removal, sediment capping, creek diversion, bank stabilization, wetland features, and water retention/flooding controls.

Develop a Memorandum of Understanding between EPA Regions 6 and 7.

The Memorandum of Understanding (MOU) is intended to help coordinate EPA Region 6 and 7's investigation and remediation of the watershed areas in the Tri-State Mining District, which includes parts of Ottawa County in Oklahoma, Cherokee County in Kansas, and Jasper and Newton counties in Missouri. EPA Regions 6 and 7 will use the MOU to avoid duplicating efforts, combine resources, and realize economies of scale and execute appropriate Superfund decision documents consistent with their delegated authority. The draft MOU was released for stakeholder review and comment in December 2018. The final MOU is anticipated to be issued in 2019.

Coordinate ROD Planning and Implementation between EPA Regions 6 and 7.

This coordinated approach will be a comprehensive and joint process to develop remedial alternatives, proposed plans and

decision documents that account for and respect the large watershed areas that cross regional boundaries. EPA Regions 6 and 7 will use the remedy selection coordinated approach to support the "One EPA" cohesive message to present to and coordinate with stakeholders, including tribes, states, other federal agencies, communities and interested non-governmental organizations.

Near-Term Actions for OU5

- Complete the Remedial Investigation and Human Health Risk Assessment.
- Continue Coordination with Tribes, States, the Community and other Federal Agencies.
- Complete the Feasibility Study and Associated Treatability Studies.
- Develop a Memorandum of Understanding between EPA Regions 6 and 7.
- Coordinate ROD Planning and Implementation between EPA Regions 6 and 7.
- Issue Watersheds ROD.

PLANNED CLEANUP & RELATED

OU1				Status	Completion Target	Action	Partner Lead
Status	Completion Target	Action	Partner Lead				
Ongoing	Ongoing	Identify for EPA's consideration additional wells that require closure.	ODEQ	Ongoing	Ongoing	Continue residential yard and high-access area remedial actions.	ODEQ
				Ongoing	Ongoing	Continue sampling of new properties as they are identified.	ODEQ
Ongoing	Ongoing	Continue O&M by ODEQ (groundwater monitoring of Roubidoux Aquifer, inspection of dikes and diversion structures).	ODEQ	Ongoing	Ongoing	Continue operation of telephone hotline for Ottawa County residents to request soil sampling.	ODEQ

OU2

Site-wide				OU5			
Status	Completion Target	Action	Partner Lead	Status	Completion Target	Action	Partner Lead
Planned	2019	Initiate Site's sixth Five-Year Review.	EPA	Ongoing	Ongoing	Complete remedial investigation, human health risk assessment and feasibility study.	EPA
Planned	2020	Complete Site's sixth Five-Year Review.	EPA	Planned	2021	Issue watersheds ROD.	EPA

ACTIONS (2019 to 2021)

OU4

<i>Status</i>	<i>Completion Target</i>	<i>Action</i>	<i>Partner Lead</i>
Ongoing	Ongoing	Continue collaborating with the Quapaw Nation, ODEQ and other stakeholders to effectively prioritize the remediation of source material near riparian areas to reduce metals loading to Tar Creek, Lytle Creek, Beaver Creek and Hockerville/Ontario Creek.	EPA, ODEQ, Quapaw Nation
Ongoing	Ongoing	Continue cleanup of remaining chat piles, chat bases and fine tailings deposits through cooperative agreements with the Quapaw Nation and ODEQ.	EPA, ODEQ, Quapaw Nation
Ongoing	Ongoing	Continue cleanup of transition-zone soil contamination.	EPA, ODEQ, Quapaw Nation
Ongoing	2020	Complete remedial design for Core Area (i.e., the site area with the greatest concentration of chat piles/bases along Tar Creek and Lytle Creek) and plan for remedial action.	EPA, ODEQ, Quapaw Nation
Planned	2020	Issue an amendment to the mining waste ROD in 2020.	EPA
Ongoing	Ongoing	Continue bioaccumulation studies on row crops (i.e., winter wheat, corn, soybeans, and pasture grasses) to confirm that OU4 ROD remediation goals for cadmium, lead, and zinc and proposed ecological-based preliminary remediation goals for cadmium and zinc yield EPA-acceptable risks for crop consumers and consumers of milk and beef from grazing beef and dairy cattle.	EPA
Ongoing	Ongoing	Continue to evaluate the “moving window approach” – used to define remediation areas for ecological receptors – as a tool to help reduce soil excavation volumes and remedial action costs.	EPA, ODEQ, Quapaw Nation
Ongoing	Ongoing	Continue to evaluate the consolidation and capping of chat piles/bases and fine tailings to reduce remedial action time and costs.	EPA, ODEQ, Quapaw Nation
Ongoing	Ongoing	Continue to inventory and map ongoing, completed, and planned remediation areas to facilitate the prioritization of remedial actions.	EPA, ODEQ, Quapaw Nation
Ongoing	Ongoing	Continue to assess various options for reducing the amount of topsoil taken to the repository and also for reducing the costs of the remedial actions.	EPA, ODEQ, Quapaw Nation
Ongoing	Ongoing	Continue to develop preliminary remediation goals, based on site-specific data.	EPA
Ongoing	Ongoing	Continue to provide technical support to the Quapaw Nation and ODEQ during the implementation of the remedial action for OU4.	EPA
Ongoing	Ongoing	Continue cleanup of residential yards not already addressed under OU2, as needed.	EPA, ODEQ
Ongoing	TBD	Perform general maintenance activities for the Central Mill Repository, including collaboration with site partners on the redesign of the repository in an effort to reduce O&M costs to be funded by ODEQ after closure.	EPA, ODEQ, Quapaw Nation
Ongoing	Ongoing	Continue to assess three areas where soil amendments have been applied, with the objective of reducing the bioavailability of cadmium, lead, and zinc to reduce the amount of topsoil taken to the repository for disposal and remediation costs.	EPA
Ongoing	Ongoing	Continue support for chat sales.	EPA
Ongoing	Ongoing	Continue end-user chat inspections to determine compliance with the Chat Rule.	EPA
Ongoing	Ongoing	Continue operation of Mayer Ranch and Southeast Commerce passive treatment systems.	ODEQ
Ongoing	Ongoing	Continue community involvement activities according to cooperative agreement requirements, with support from EPA.	ODEQ, Quapaw Nation
Ongoing	2019	Complete solar feasibility assessment at the Bird Dog area and surrounding property for a solar development.	EPA, Quapaw Nation, Grand River Dam Authority
Planned	2021	Complete partial NPL deletions.	EPA, ODEQ and Quapaw Nation

Overview

EPA and its site partners often discuss much longer-range strategies and considerations to help make cleanup of the Site more efficient and less costly. To date, site partners have shared many ideas and suggestions that could be pursued to achieve these goals. Over the next several years, these ideas will begin to take more concrete shape.

Reevaluate Land Use Assumptions.

EPA and its site partners now recognize that it is not feasible or appropriate to remediate all areas of the Site to residential cleanup standards as defined in the OU4 ROD. In upcoming years, EPA will evaluate alternative land uses across the Site and consider updating the remedial goals as appropriate to reflect those land uses. Evaluating alternate land use scenarios such as grazing and farming (i.e., row crop production), will minimize the volume of chat and soil requiring remediation, potentially accelerating cleanup, promoting property reuse and reducing remediation costs.

Consider Consolidating Chat Ownership and Improve Marketability of Chat.

Commercial use of chat has been low due to several factors. EPA is considering evaluating the use of dedicated storage areas for chat consolidation, feasibility of direct payments to chat owners and additional transportation options. EPA, ODEQ and the city of Miami are jointly

involved in a rail spur project in Miami, which could be a transportation option that chat processors could use to increase the shipping distance of chat at a competitive rate. These opportunities are presented in white papers developed by the Quapaw Nation.

Explore Innovative Technologies.

In recent years, recovery and extraction technologies for mine waste products have advanced. EPA and its site partners recognize that the current remediation strategy will require the management and maintenance of large quantities of mine waste material. As a result, ongoing review and investigation of new and improved innovative technologies can promote cleanup efficiencies, reduce the volume of waste materials managed in perpetuity, and economically benefit project costs and schedules as well as area communities.

Identify Additional Reuse Opportunities.

EPA and site partners regularly seek out opportunities to support reuse at the Site. These include new agricultural uses as well as a new cultural tourism project centered around the Catholic 40 site. Another project is underway to evaluate the feasibility of siting renewable energy facilities on part of the Site. Recently, opportunities to develop a splash park and expand greenspace are also being considered. Looking forward, EPA and site partners will work closely to further identify and coordinate additional reuse opportunities that provide the most benefit for site communities.

CONCLUSION

The Tar Creek Superfund Site in Ottawa County, Oklahoma, is one of the largest and most complex cleanups in the United States. Substantial progress has been made since the Governor of Oklahoma established the Tar Creek Task Force in 1980, and EPA placed the Site on the NPL in 1983. Actions taken since the Site's listing include the relocation of communities most impacted by mining-related waste, the remediation of many chat bases and chat piles, the remediation of thousands of residential yards, the decline in blood lead levels in children, and the initiation of surface water and sediment investigations and human health risk assessments. Although significant progress has been made and is ongoing, substantial work is still required to fully remediate the Site, which will take decades and multi-millions of dollars to complete.

In 2018, the Site was placed on the EPA Administrator's Emphasis of "Superfund Sites Targeted for Immediate, Intense Action. In response, EPA, ODEQ, the Quapaw Nation and other stakeholders are taking additional steps to identify opportunities that can accelerate cleanup and revitalize cleaned-up areas sooner. EPA and its site partners are committed to new strategic approaches that can achieve this outcome. In addition to these ongoing remedial actions and related efforts, EPA is committed to cooperating and coordinating with state, community, tribal, university and federal partners to complete the investigation and decision-making process for impacted watersheds. Through dedication, teamwork, the planning process and a commitment to getting things done, EPA and its partners have and will continue making great strides in cleaning up the Tar Creek Superfund Site and making areas available for beneficial reuse.



EPA Region 6, ODEQ and QNEO staff meet at the Site in July 2018. From left: Summer King, Environmental Scientist, Quapaw Nation; Dustin Davidson, Environmental Programs Manager – Tar Creek Section, ODEQ; Kelly Dixon, Land Protection Division Director, ODEQ; Tim Kent, Environmental Director, QNEO; John Meyer, EPA Region 6 Superfund Branch Chief; Anne Idsal, EPA Region 6 Administrator.



EPA Region 6

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