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EPA Superfund
Record of Decision Amendment:

CHEROKEE COUNTY
EPA ID: KSD980741862
OU 03, 04
GALENA, KS
09/29/2006

RECORD OF DECISION AMENDMENT

CHEROKEE COUNTY SUPERFUND SITE
BAXTER SPRINGS AND TREECE SUBSITES
OPERABLE UNITS #03 AND #04

CHEROKEE COUNTY, KANSAS

Prepared by:

U. S. Environmental Protection Agency, Region 7
901 North 5th Street
Kansas City, Kansas 66101

September 2006

RECORD OF DECISION AMENDMENT

DECLARATION

SITE NAME AND LOCATION

Baxter Springs and Treece Subsites, Operable Units #03 and 04 (OU-3 and OU-4)
Cherokee County Superfund Site
Cherokee County, Kansas

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for mine waste at OU-3 and OU-4 of the Cherokee County Superfund Site. This decision was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Contingency Plan (NCP), This decision is based. on the Administrative Record for the site. The Administrative Record file is located at the following information repositories:

Johnston Public Library	U.S. Environmental Protection Agency
210 West 10th Street	901 North 5th Street
Baxter Springs, Kansas	Kansas City, Kansas

The state of Kansas concurs with this selected remedy. Additionally, the U.S. Fish and Wildlife Service concurs with the selected. remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response actions selected in this Record of Decision (ROD) Amendment, present a current threat to public health, welfare, or the environment, The site contains heavy metals in various environmental media resulting from historic lead-zinc mining and processing.

DESCRIPTION OF THE SELECTED REMEDY

The U.S. Environmental Protection Agency (EPA) believes the selected remedy (Modified Alternative 8A with an estimated cost of $66 million) appropriately addresses the principal current and potential risks to human health and the environment. The remedy addresses ecological and human health risks by the remediation of surficial mine waste with elevated levels of heavy metals. The major components of the selected remedy for the two subsites (Baxter Springs and Treece) include the following actions,

- Excavate, consolidate, and/or cap all surficial mine waste followed. by disposal and capping.

- Utilize subaqueous mine waste disposal to the maximum extent practicable.

- Encourage source reduction via responsible chat sales before and during remedy implementation.

- Adopt Institutional Controls for future development specified in an earlier ROD.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state laws that are legally applicable or relevant and appropriate requirements for the remedial action (unless previously waived in the ROD), and is cost effective, The remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable but may not satisfy the statutory preference for treatment as a principal element because of the large volume and potentially expensive methods to stabilize or treat the mine waste and the effectiveness of nontreatment alternatives. Because this remedy will result in. hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

Cecilia Tapia, Director
Superfund Division
U.S. EPA, Region 7

9-29-06
Date

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A. INTRODUCTION

This Record of Decision (ROD) Amendment concerns upcoming remedial actions at the Baxter Springs and Treece subsites of the Cherokee County Superfund Site, Cherokee County, Kansas (Site). It provides background information, summarizes recent information driving the selected alternative, identifies the selected alternative for cleanup and its rationale, and summarizes public review and comment on the selected alternative.

This ROD Amendment is a document that the U.S. Environmental Protection Agency (EPA), as lead agency for the Site, is required to issue to fulfill the statutory and regulatory public participation requirements found, respectively, in section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, and in section 300.430(f)(4) of the National Contingency Plan (NCP).

The EPA is the lead agency for the development of this ROD Amendment and the selected alternative. The EPA bas coordinated development of this ROD Amendment with the Kansas Department of Health and Environment (KDHE), the support agency. This ROD Amendment includes formal input from the support agency on the selected alternative. The EPA bas also consulted with the U.S. Fish and Wildlife Service (USFWS) in the preparation of this document. With the exception of the shallow aquifer groundwater chemical-specific applicable or relevant and appropriate requirement (ARAR) (previously waived in the 1997 ROD), the selected alternative is expected to meet ARARs and be protective of human and ecological receptors. This ROD Amendment retracts the technica1 impracticability (TI) waiver for surface water chemical-specific ARARs, which was part of the 1997 ROD, for several reasons. First, EPA (Region 6) and the state of Oklahoma are involved with efforts to complete a Remedial Investigation/Feasibility Study (RI/FS), Baseline Human Health Risk Assessment (BHHRA), and Ecological Risk Assessment (ERA) for the mine waste operable unit (OU) at the adjacent Tar Creek Superfund Site. It is expected that a ROD for addressing this mine waste will be issued by Region 6 in the future. Therefore, it seems appropriate that Region 7 also issue a decision document (i.e., this ROD Amendment) about its remaining upstream mine waste. Secondly, in 1997, the state of Kansas supported the TI waiver based on the lack of downstream mine waste cleanup actions at the Tar Creek Superfund Site. Recently, the state of Kansas has changed this view on Baxter Springs and Treece subsites' mine waste cleanup, mostly due to the recent Region 6 and state of Oklahoma investigation actions. Finally, additional investigations by the United States Geologic Survey (USGS), the publication of the total maximum daily loads (TMDL) by the state of Kansas, the depth to the shallow groundwater aquifer, and the overlying shale/nonyielding limestone (all summarized later in the report) all indicate that significant surface water metal contamination comes from mine waste and not shallow groundwater. Therefore, Region 7 believes it is now technically practicable under a ROD Amendment to meet the surface water chemical-specific ARARs. No other waivers of ARARs for the Site are proposed.

B. COMMUNITY PARTICIPATION

The public was encouraged to participate in the Proposed Plan and ROD Amendment process at OU-3 and OU-4, The Proposed Plan highlighted key information from the RI and FS Reports, FS Addendum Report, ROD dated August 1997, final Remedial Action (RA) report for

the Baxter Springs subsite, final residential RA report for the Treece subsite, Five-Year Review Reports, and Administrative Record (R). Additionally, the public historically has been made aware of the environmental issues in the county through the many public meetings, public availability sessions, newspaper articles, television coverage, radio broadcasts, and press releases that have occurred at the Site for the many environmental cleanups conducted to date. In order to provide the community with an opportunity to submit written or oral comments on the OU-3 and OU-4 Proposed Plan, the EPA established a 30-day public comment period from July 24 to August 22, 2006. A public meeting was held on August 10, 2006, at 7:00 p.m. at the Baxter Springs Community Center, Baxter Springs, Kansas, to present the Proposed Plan, accept written and oral comments, and answer any questions concerning the proposed cleanup remedy. Over 60 people attended the public meeting and the event was covered by a local newspaper and television affiliates. A summary of the verbal questions received at the public meeting, inclusive of responses, is provided in the attached Responsiveness Summary. The Responsiveness Summary also contains a summary of written correspondence received during the public comment period as well as written responses to that input.

The Proposed Plan and supporting AR file were made available for public review during normal business hours at the Johnston Public Library in Baxter Springs, Kansas, and at the Region 7 office in Kansas City, Kansas. Additional AR files supporting the EPA's historical cleanups at the Badger, Waco, Lawton, and Crestline subsites; and Galena subsite are also available at the Region 7 office and at the Columbus Public Library in Columbus, Kansas, and the Galena Public Library in Galena, Kansas, respectively. These additional ARs are incorporated into the OU-3 and OU-4 AR by reference, Moreover, the OU-3 and OU-4 AR has been updated with additional information to support this ROD Amendment.

C. SITE BACKGROUND

The Site spans 115 square miles and represents the Kansas portion of the former Tri-State Mining District (TSMD). The Site is arranged into seven OUs for administrative efficiency in conducting environmental cleanups: OU-1, Galena Alternate Water Supply; OU-2, Spring River Basin; OU-3, Baxter Springs subsite; OU-4, Treece subsite; OU-5, Galena Groundwater/Surface Water; OU-6, Badger, Lawton, Waco, and Crestline subsites; and OU-7, Ga1ena Residential Soils. The Site is depicted on Figure 1.

This ROD Amendment is concerned solely with OU-3 and OU-4, consisting of the Baxter Springs and Treece subsites which are located in the southern portion of the Site and are shown on Figures 2, 3, and 4. Contaminated media at the OU-3 and OU-4 subsites include mine waste (source material), soils, groundwater, sediments, and surface water, The contaminants of concern (COCs) are zinc, lead, and cadmium. The contamination was caused by lead and zinc ore mining and processing that began in Kansas in the 1870s and continued until 1970. The mining and processing generated chat piles and tailings that are the sources of the COCs.

The EPA placed the Site on the National Prio6,ties List (NPL), set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on September 8, 1983, 48 Fed. Reg. 40658. Subsequent to the NPL listing, investigation of the subsites bas consisted of the RI/FS, the FS Addendum, the ROD, various RA reports, successive Five-Year Review Reports, and Proposed Plan that form the basis for this ROD Amendment, plus visits by the EPA, the KDHE, and the USFWS to the subsites.

The EPA, through its enforcement authorities, negotiated an Administrative Order on Consent (AOC) with certain potentially responsible parties (PRPs) to conduct the RI/FS for both subsites. The PRPs performing these activities under the AOC were Cyprus Amax Minerals Corporation (corporate successor is currently Phelps Dodge Corporation); ASARCO, Inc.; Gold Fields American Corporation; Blue Tee Corporation; NL Industries, Inc.; St. Joe Minerals Corporation (corporate successor is currently The Doe Run Co.); and Sun Company, Inc. Following the submittal of the RI/FS, the EPA requested and received an FS Addendum from the PRPs, detailing an additional, EPA-suggested remedial alternative. The FS Addendum remedial alternative subsequently formed the basis of a Proposed Plan generated by the EPA. After considering public and PRP comments on the Proposed Plan, the EPA published its selected remedy, a mixture of residential soil remediation and source reduction, for the Baxter Springs and Treece subsites in a ROD in August 1997. A Consent Decree for the planned Remedial Design (RD) and RA for both subsites was formalized in 1999 with the same PRPs who conducted the RI/FS. Additionally, bankruptcy funds were recovered from an additional PRP, Eagle-Picher Industries, Inc., and. utilized for response actions at the Baxter Springs and Treece subsites.

As summarized in the ROD, an exposure study conducted by the Agency for Toxic Substances and Disease Registry at a nearby subsite in Cherokee County in 1996 found a 10.5% exceedance of blood lead levels above 10 micrograms per deciliter (µg/dl) of blood for a hypothetical child. This actual rate of child blood lead exceedance is in excess of EPA's goal for residential lead sites of no more than a 5% chance of any child exceeding 10 µg/dl. Additionally, the human health risk assessment used the applicable Integrated Exposure Uptake Biokinetic Model (IEUBK Model) to simulate lead exposure to children, The IEUBK model indicated unacceptable risk to children due to elevated lead concentrations in soil. Cadmium was also a COC for human health due to potential ingestion of groundwater and locally grown vegetables. Similarly, the ecological risk assessment indicated a significant and unacceptable risk to aquatic organisms and terrestrial fish predators from elevated cadmium, lead, and zinc concentrations.

Based on these risks, the ROD evaluated a select number of preferred alternatives from the FS and FS Addendum using the nine NCP criteria. Ultimately, the selected remedy for both subsites included investigation and potential remediation of residential yards impacted by mine waste; closure and abandonment of poorly constructed, existing deep water wells and borings to prevent contamination migration from the upper aquifer to the lower aquifer; and institutional controls on future development. Additionally, for the Baxter Springs subsite, the selected remedy included excavation, consolidation, and capping of select mine waste based on its proximity to or location in streams; select stream rechannelization; and construction of stream diversion/control structures. The selected remedy did not meet the surface water quality standards under the Clean Water Act or the groundwater drinking water standards for the shallow aquifer under the Safe Drinking Water Act due to technical impracticability. Thee TI waiver ensured a similar surface .water approach to that employed at the site adjacent to and downstream of Treece, the Tar Creek Superfund Site in Oklahoma, which used a fund-balancing waiver in the 1980s for select surface water ARARs.

At Baxter Springs, the residential aspect of the RA included sampling and remediation, as necessary, of residential soils from properties impacted by mining activities. These activities consisted of the importation of mine waste from nearby waste accumulations for residential purposes (landscaping, fill material, driveway material, etc.), as well as erosion of wastes from

these areas. Wastes also migrated into stream systems and could have been transported to residential areas near streams during flood events. Mine waste is prevalent in the western area of the Baxter Springs conzmunity, thus, most of tbe residential effoit was targeted in this area. Propeities with values exceeding 800 parts per million (ppm) lead or 75 ppm cadmium (based on discrete samples rather than composite samples suggested by later EPA guidance) weze excavated until lead and cadmium levels were less than 500 ppm and 25 ppm, respectively, or until a maximurn excavation deptb of one foot was achieved. Properties were backfilled with clean native soils and revegetated. The same criteria were utilized for residential work at otber OUs at the Site, including Treece (OU-4). At the Baxter Springs subsite, 441 properties were sampled and 46 yards were remediated.

The mine waste cleanup portion at Baxter Springs included the removal of mine waste from select minor streams and drainages, draining and capping several tailings impoundments, and grading, consolidating, aod capping a major chat pile, followed by revegetation of all disturbed areas. The revegetation seed mixture consisted of tall, warm-season native grasses. This mine waste cleanup addressed mine waste accumulations that contributed major loadings to surface water bodies. Approximately 160 acres or 700,000 cubic yards of mine waste were remediated at the Baxter Springs subsite. This work was completed in 2004 and is currently in tbe long-term operation and maintenance (O&M) phase. Some surficial accmnulatiou.s of mine waste were not addressed by the remedy at the time because they were deemed to not be significant contributors to thc degradation of surface water. Figure 5 shows the remediated mine waste locations.

At the Treece subsite, the RA consisted of a residential soil cleanup. Just as at Baxter Spzings, the town of Treece is located near several former mining areas and waste from these areas were transported to residential locations for a variety of puiposes such as driveway construction, landscaping, fill material, and alley/road construction. The residential soil remediation consisted of the same trigger criteria and yard construction as the Baxter Springs subsite. The residential work at OU-4 was completed by the PRPs in 2000 under the same 1999 Consent Decree as the OU-3 work and is in the O&M phase. A total of 148 properties were tested and 41 yards were remediated. Additional components of the Treece subsite response action included a well search to determine if any residents in the Treece area were consuming contaminated water from private water wells followed by the abandonment of these wells when identified. Moreover, any deep wells providing a conduit to transmit contaminated water from the upper aquifer to the lower pristine aquifer were to be abandoned under the Treece cleanup. Well search activities did not identify any deep wells transmitting contaminants to the lower clean aquifer or any residents consuming impacted groundwater. The town of Treece is served by a municipal water system regulated by the state and provides safe drinking water. Nonresidential mine waste at the Treece subsite was not addressed by the remedy.

During the course of previous Baxter Springs and Treece subsite activities, as well as for work at other subsites within the Site, the EPA and the KDHE have conducted numerous public meetings and availability sessions, distributed and mailed factsheets, and been interviewed by local print and broadcast media outlets. Additionally, several Site tours have been conducted for many diverse groups inclusive of federal and state agencies, universities, professional organizations, and political entities.

D. SITE CHARACTERISTICS

The mining-related physical characteristics of the subsites include mine shafts, mine subsidence pits, impoundment tailings, chat piles, overburden piles, and bull rock piles. Milling wastes are grouped into two broad categories – chat and tailings – while nonmilling wastes are also grouped into the two categories of overburden and bull rock. Chat is composed of gravel and sand-sized matezia1s that are typically found in large piles, while tailings are fine, silt to c1ay-sized wastes that are typically found in areas impounded by berms or dikes. Chat and tailings are the hazardous source materials of concern due to elevated levels of heavy metals, especially zinc, lead, and cadmium. The average lead concentration in the tailings was approximately five times higher than the average lead concentration in the chat, while the average concentration of cadmium mid zinc in the tailings relative to chat was approximately 2.7 and 2.6 times higher, respectively. Thus, overall, the finer particles (tailings) are more highly concentrated in the COCs than the larger particles (chat). Furthermore, the mine waste also contains detectable levels of the hazardous substances arsenic, copper, mercury, and manganese, although these metals were determined to not be risk drivers. Previously some of the berms or dikes around tailings impoundments have eroded or been overtopped and the tailings have washed into nearby streams (outwash tailings). There are five major areas of these outwash tailings associated with Tar Creek at the Treece subsite and two outwash tailings areas remain at the Baxter Springs subsite. These outwash tailings are major sources of contamination to stream sediment and surface mater. Finally, some soils in the immediate vicinity of the mine waste have elevated levels of metals, likely the result of several transport processes, including windblown dust from the mine waste, surface water flows, groundwater seeps, and redistribution from chat removal or quarrying operations. Overall, the primary source material to the subsites is the chat piles, tailings, and outwash tailings. The acreage and/or volume of each type of mine waste is summarized in Table 1 for both subsites. Since the ROD, subsequent commercial chat sales have reduced the overall mine waste volume at approximately six chat piles located at the Treece subsite, The RA at the Baxter Springs subsite has also reduced the volume of waste. The mine waste actually remaining at both subsites will be more accurately determined during the project's RD phase.

Overburden is typically found in piles composed of large boulder-sized material predominantly comprised of shale and limestone. This nonhazardous material was removed or excavated in order to reach the deeper ore-bearing zones. Bull rock is a local term for the cobble- to boulder-sized material typically found in cone-shaped piles and comprised of cherty limestone and breccia. Bull rock is material that did not meet milling requirements and may also consist of overburden materials removed prior to reaching the prime ore-bearing zones Bull rock may exhibit low-grade mineralization but is generally considered to be nonhazardous.

The mining areas also include several shafts and collapse features that are filled with either surface water and/or groundwater, depending upon the characteristics of the individual feature. The ponds or collapse features develop due to the extensive amount of undermining within the subsites. Collapses result in areas underlain by subsurface room and pillar mines. Tbe underground mines were situated approximately 200 to 500 feet below the surface with the deeper mines located near Treece Mine shafts were used for access and ore extraction. There are also some exploration drill boles aod air shafts within the subsites. Also, open shafts and pits receive metals-laden run off from mine tailings and chat piles in many instances.

All surface water flows in the Treece subsite are to Tar Creek, while that of the Baxter Spring subsite flows to either Willow Creek or Spring Branch. Tar Creek, the major geographic feature impacting remedy selection at the Treece subsite flows south into Olclaboma and drains into the Neosho River approximately ten miles south of the subsite. The major geograpbic features impacting remedy selection at the Baxter Springs subsite are Willow Creek, Spring Branch, and tbeir tributaries. The Baxter Springs subsite drains into the Spring River on the eastern side of the subsite. The streams at both sites are plains-type streams underlain by Pennsylvanian-age shales and Mississippian-age limestones. Both the Spring River and Neosho River are major interstate streams. All of these surface water bodies are contaminated by the subsites' mine waste, which adversely affect aquatic life and possibly waterfowl As explained in more detail in Section 6, the KDHE has determined that Tar Creek and streams within the Spring River watershed are either partially or not at all supporting aquatic life due to metals loading. Additionally, mining-related zinc load contributions to the Spring River by Willow Creek and Spring Branch and to the Neosho River by Tar Creek and its tributaries are documented in the ROD at 24,000 pounds per year and 220,000 pounds per year, respectively,

From surface to depth, the subsites are underlain by a shale formation of Pennsylvanian age, a nonyielding limestone formation of Mississippian age, and two aquifers that are separated by a confining unit. The Pennsylvanian shale yields less than ten gallons of water a minute. Nonvisible flow and ponded water in streams during dry periods indicates little water storage capacity by the underlying shale. The uppermost portion of tbe Mississippian limestones does not yield water to wells. These two formations together, which lie above the shallow aquifer, are between zero and 220 feet thick. The shallow upper aquifer is locally called the Boone Aquifer and is another Mississippian-age limestone unit. Over four measuring events during the RI, the potentiometric water level ranged between 27.58 feet below ground surface (bgs) and 190.25 feet bgs. This excludes the Bruger shaft whose surficial overflow was diverted from nearby Willow Creek as part of the 1997 ROD. Regional groundwater flow in the upper aquifer is west to northwest. The lower sandy dolomitic aquifer (known as the Roubidoux) is confined and the regional groundwater flow direction is west to south. Public water supply districts provide water from the deep aquifer, mixed with Spring River water in eastern Baxter Springs for that city according to the RI, to residents of the subsites. Shallow groundwater in the mine workings typically exceeds water quality standards but the extent of impacted groundwater has not been characterized to date.

Past practices in the Site have resulted in chat being distributed to residential yards as fill or driveway material. The sampling results of residential yards in proximity to the mine waste in these subsites identified a number of residcntia1 properties that required remediation, as has occurred at other subsites in Cherokee County. Subsequent actions taken regarding these residential hazards are summarized previously in Section C.

Since the RI was completed in 1993, the Kansas Department of Wildlife and Parks (KDWP) has updated and changed the status of a number of threatened and endangered species in Cherokee County. In total, there are nine threatened or endangered species whose designated critical habitats are partially within the subsites, mostly within the eastern portion of the Baxter Springs subsite. The nine threatened and endangered species consist of the following: cave salamander, eastern narrowmouth toad, eastern newt, green frog, grotto salamander, longtail salamander, many-ribbed salamander, redbelly snake, and the spring peeper. Recent KDWP fact sheets on these species have been included in the AR.

E. CURRENT AND POTENTIAL FUTURE LAND USE AND RESOURCE USES

Currently the subsites are accessible by paved roads, gravel roads, or by foot, Several rail lines traverse both areas, as does Tar Creek and its tributaries at the Treece subsite, and Willow Creek Spring Branch, and their tributaries at the Baxter Springs subsite. At both subsites, large areas are and will probably continue to be used for agriculture (primarily grazing) and residences. The nearby areas of chat piles, tailings, and subsidence are not vegetated and are essentially unused by humans. However, at both sites to varying degrees, residences and residential features (e.g., baseball playing field) abut or are situated on unremediated mine waste. Select chat piles in the subsites have been and continue to be exploited commercially to supply aggregate for roadway construction. Maps of the subsites (Figures 2, 3, and 4) attached to this Proposed Plan depict some major features of the area as well as the extent of the chat piles, tailings impoundments, and outwash tailings.

F. SCOPE AND ROLE OF OPERABLE UNITS

The Site is arranged into the following seven OUs for administrative efficiency in conducting environmental cleanups: OU-1, Galena Alternate Water Supply; OU-2, Spring River Basin; OU-3, Baxter Springs subsite; OU-4, Treece subsite; OU-5, Galena Groundwater/Surface Water; OU-6, Badger, Lawton, Waco, and Crestline subsites; and OU-7, Galena Residential Soils. A summation of previous remedial actions at the Baxter Springs and Treece subsites is offered in Section C. Brief overviews of the status of the other Cherokee County OUs are provided below.

OU-1: Galena Alternate Water Supply – This OU is in the long-term O&M phase. The completed EPA-funded cleanup consisted of providing a permanent water supply to over 400 residences by the installation of deep aquifer drinking water supply wells and the formation of a rural water district. The district has expanded by over 100 new hook-ups (paid for by residents) since the cleanup was completed in 1994 and serves the rural areas of Galena, Kansas (over 500 total hook-ups).

OU-2: Spring River Basin – This OU consists of the Spring River basin in Kansas, and, as such, it is directly influenced by the other subsite cleanups at the Site as well as upstream cleanups planned for the Jasper County, Missouri, Superfund Site. The work is in the characterization phase and will likely represent the final area to be addressed at the Site.

OU-3: Baxter Springs Subsite – Previous response actions at OU-3 are summarized in Section C, Site Background.

OU-4: Treece Subsite – Previous response actions at OU-4 are summarized in Section C, Site Background.

OU-5: Galena Groundwater/Surface Water – The EPA-funded cleanup was completed in 1995 and the OU is in the long-term O&M phase. The work included the remediation of 900 acres of mine waste and the abandonment of deep wells acting as a potential conduit for contaminants to migrate from the upper impacted aquifer to the lower pristine aquifer. A subsequent multi-year

ecological study conducted by the University of Kansas Biological Survey indicated some improvement to Short Creek following the cleanup. The KDHR is currently evaluating ongoing O&M costs at this OU.

OU-6: Badger, Lawton, Waco, and Crestline Subsites – This OU is reaching the end of the RD/RA negotiation phase with the PRPs. The RI/FS was completed in 2004 under an AOC issued in 1998 and a ROD was issued for the cleanup in 2004. The RD/RA negotiations are anticipated to be completed in 2006 and result in two Consent Decrees: one for the Waco subsite and one for the Crestline subsite. The Badger and Lawton RD/RA processes will be conducted as EPA fund-lead actions,

OU-7: Galena Residential Soils – The EPA-funded cleanup was completed in 2001 and is now in the long-term O&M phase. The work included the characterization of nearly 1,500 residential properties and the remediation of over 700 properties,

G. POST REMEDIAL ACTION INFORMATION AND DATA

Since the ROD for these subsites was released in August 1997, additional studies, observations, risk calculations, and information have been collected and published which together drive the remedial action selected in this document, particularly the ecological scientific studies and risk calculations. First, several pertinent ecological scientific studies have been published and additional regional ecological risk information has been identified. Additionally, three new residences in Treece have been constructed on or near mine waste in the past five years. Next, several rounds of water and sediment samples from surface water bodies have been collected by various parties at both subsites and. the USGS has released new publications on this topic. Finally, as documented in the 2005 Five-Year Review Report, Region 6 and the state of Oklahoma are investigating surficial mine waste remedial actions at the Tar Creek Superfund Site adjacent to and downstream of the Treece subsite. The general public and local governments have also provided input that is discussed later in this section. These recent actions and new information are described in more detail below.

Ecological Scientific Studies: Since the ROD, several studies have been published demonstrating the deleterious effects of mine waste on a number of ecological endpoints. First, bird toxicity from exposure to mine waste or mining-impacted media (water, sediment, etc.) has been examined and reported in scientific journals in the past several years, For instance, zinc toxicosis has been documented in wild birds collected at the Site and the scientific findings indicate that the TSMD is the only likely location with sufficient zinc concentrations capable of causing the observed effects. These studies have shown zinc toxicity to avian species that had been unreported in the past. Additionally, mussel studies (by Dr. R. Augeio of KDHE, presented at the TSMD Forum in 2005 and Sediment Synposium at the Association of State and Territorial Solid Waste Management Officials in 2006) for the Spring River have been released over the past several years. These findings indicate significant impacts to local mussel populations as a result of surficial mine waste washing into stremn systems and impacting the surface water and sediments

Moreover, EPA ecologists recently developed Preliminary Remediation Goals (PRGs) for metals-impacted soil for select terrestrial receptors for the Site based on site-specific data,

including bioconcentration factors. It mas determined that ecological PRGs for soil ranged from 1.0 to 10.0 ppm for cadmium; 377 to 1,175 ppm for lead; and 156 to 1,076 ppm for zinc, respectively. As shown in the RI, mill-site soils ("soils from obviously disturbed or affected areas which contain visible chat fragments [and possible tailings]") had average concentrations of 55 ppm, 410 ppm, and 8,300 ppm for cadmium, lead, and zinc, respectively. These average concentrations, which are similar to the average chat concentrations as documented in the RI, exceed all the low-range ecological PRGs and the high-range ecological PRGs for cadmium and zinc, and indicate a risk for ecological reccptors,

Furthermore, recent information also indicates possible impacts to local horses, At least three deceased foals from the OU-4 area were examined by a local veterinarian, The findings indicated possible heavy metal impacts/interactions from mine waste or mining-impacted media was the likely cause of death. Other horses at OU-4 are undergoing treatment for effects thought to be a result of mining impacts. Zinc toxicosis in the TSMD has been reported for decades and particularly affects foals. An EPA ecological risk assessor calculated high and low potentials for zinc toxicity for foals in pastures. These potentials were calculated based on two assumptions: first, the potentials were done specifically for foals, which are more sensitive to zinc toxicity, so lower body weights were used in the Average Daily Dose equation; and second, that as vegetation becomes more stunted due to increasing soil zinc concentrations, horses would ingest increasing amounts of soil while attempting to forage for food. By inserting Lowest-Observed-Adverse-Effect Level doses in the Average Daily Dose equation and back-calculating, a soil concentration of 8,500 ppm was determined to be the zinc concentration at which a high potential for zinc toxicity in horses exists. Using a similar back-calculating process and No-Observed-Adverse-Effect Level doses in the Average Daily Dose equation, a soil concentration of 1,000 ppm was determined to be the zinc concentration below which horses are unlikely to be affected by zinc toxicity. As documented in the RI, zinc in chat and tailings piles ranges from 3,100 ppm to 13,000 ppm and 6,400 ppm to 52,000 ppm, respectively – far greater than the 1,000 ppm concentration below which horses are unlikely to be affected. Thus, although the horses in the TSMD are not feral, it is clear that unremediated mine waste is available for uptake by a wide variety of ecological receptors and represent a continuing threat.

Region 6 and State of Oklahoma Actions: The previous EPA, Region 7 OU-4 remedy did not address any surficial mine waste and employed a TI waiver for select chemical ARARs for surface water (Tar Creek and its tributaries) and groundwater in the shallow aquifer. This approach was similar to an earlier remedial approach for surface water (Tar Creek and its tributaries) taken by Region 6 at the adjoining and downstream Tar Creek Superfund Site. According to the Oklahoma Water Resources Board's Water Quality Standards (WQS) and previous Five-Year Review Report for the Tar Creek Superfund Site, Tar Creek's assigned beneficial uses were downgraded in the 1980s to Habitat Limited Aquatic Community for Fish & Wildlife Propagation and Secondary Body Contact Recreation (e.g., boating, fishing, wading, etc.). This was because "human caused conditions or sources of pollution prevent the attainment of the [Warm Water Aquatic Community] use and cannot be remedied or would cause more environmental damage to correct than to leave in place," Therefore, historically, the state of Oklahoma and Region 6 waived the surface water criteria for the Tar Creek basin on the basis of fund-balancing, and Region 7 waived surface water criteria based on a TI approach for the Treece subsite. As documented in the Region 6 Five-Year Review Report dated Apri12000, surface water in Tar Creek in Oklahoma continues to fail several of the applicable WQS, including standards for cadmium, lead, and zinc, In order to meet these criteria, source reduction.

of surficial mine waste in the uppermost section of the stream, particularly at the Treece subsite, will be critical. Additionally, the state of Oklahoma and Region 6 have begun efforts to characterize surficial mine waste at the Tar Creek site, a major contaminant source for the Tar Creek basin. Also, these agencies and others have joined a multi-state, multi-organizational effort aimed at characterizing and addressing impacts to surface water and sediments in Tar Creek and the Spring River basins. The new approach in Region 6 and Oklahoma necessitates a complementary approach in Region 7 and Kansas.

Institutional Controls: A site-wide institutional controi was implemented in 2003 by a resolution by the Cherokee County Commission at the request of the EPA with the support of the KDHE to eliminate the use of chat mine waste as surface material for all roads within Cherokee County. However, other aspects of the institutional controls program have not been fully implemented to date, including controls to prohibit the unauthorized taking and use of the mine waste for inappropriate purposes such as residential applications, or restrictions on residential construction. In their absence, there have been three documented instances of families relocating to mine waste areas at OU-4. This necessitated testing these properties and the results indicated that one property's yard needed to be remediated. This property was remediated in the spring of 2006. Moreover, some children residing in two of these three households have documented blood lead levels greater than 10 µg/dL, including the residence whose yard was remediated this past spring. On a broader scale, toxic tort lawsuits by families with impacted children have occurred in the Oklahoma portion of the TSMD in the past five years. These legal actions and environmental harm to children are a result of unremediated mine waste. There is a possibility of this situation occurring at the Site as well as other areas with uncontrolled wastes.

Total Maximum Daily Loads and Scientific Studies: The state of Kansas has established TMDLs for metals for the Tar Creek and the Spring River watersheds that seek to control and minimize impacts to the streams and watersheds. Specifically, since periodic monitoring began at Tar Creek in 1993, 66% of the surface water samples exceeded the chronic aquatic life criterion for lead. For zinc and cadmium, 100% of the surface water samples exceeded the chronic aquatic life criterion for Tar Creek. Thus, the KDHE has determined that Tar Creek is not supporting aquatic life, one of its designated uses. Additionally, the TMDL indicated that two different mechanisms appeared to be responsible for metal exceedances: one for the lead exceedances and a different one for the cadmium and zinc exceedances, Since they occurred mostly with increased run off, the lead exceedances seemed to be due to mine waste run off. In contrast, the cadmium and zinc exceedances were determined to be the result of base flow, which was water percolating through tee mine waste and seeping into Tar Creek. However, both of these mechanisms are the result of the presence of mine waste at the surface. In the Spring River watershed, while the KDHE did not focus specifically on Willow Creek or Spring Branch, the overall water quality was poor, consistently exceeding TMDLs for cadmium, lead, and zinc. The KDHE determined that the watershed was not supporting its domestic water designated use and only partially supporting its aquatic life designated use. Additionally, the KDHE documented several biological studies of macro-invertebrates conducted along the Spring River and various tributaries. Overall, these studies show a larger and more diverse biological community upstream with lower metal concentrations as compared to downstream locations exhibiting higher metal concentrations. Finally, since the completion of the remedy specified in the ROD, periodic O&M has been conducted at the Baxter Springs subsite, including surface water and sediment sampling of Willow Creek and Spring Branch. Results of historical and recent samples collected by a PRP consultant and the EPA have indicated overall decreases in the levels of cadmium, lead, and

zinc, but the levels continue to be elevated. Unremediated mine waste serves as a continual loading source of heavy metals to the Tar Creek and Spring River watersheds, and are a detriment to the TMDL criteria.

Additional Scientific Studies: In 2004, the USGS conducted streambed sediment sampling across the Site. This report can be found in the AR (Assessment of Contaminated Streambed Sediment in the Kansas Part of the Historic Tri-State Lead and Zinc Mining District, Cherokee County, 2004). The report indicated that cadmium, lead, and zinc sediment concentrations ranged from 1.2 to 270 milligrams per kilogram (mg/kg); 58 to 3,400 mg/kg; and 250 to 41,000 mg/kg, respectively, at various points in Tar Creek and its tributary Lytle Creek. In Spring Branch, cadmium, lead and zinc sediment concentrations ranged from 25 to 180 mg/kg, 340 to 810 mg/kg, and 4,200 to 16,000 mg/kg, respectively. In Willow Creek and its unnamed tributary, cadmium, lead, and zinc sediment concentrations ranged from 2.7 to 29 mg/kg, 83 to 520 mg/kg, and 640 to 8,800 mg/kg, respectively.

In addition, thc USGS compared the sample concentrations to the less stringent of either the EPA's 1998 recommended sediment quality guidelines or the consensus-based, sediment-quality guidelines developed by MacDonald and others in 2000, The threshold effects level (TEL) and threshold effects concentration (TBC) are sediment concentrations below which toxic effects rarely occur and effeets on sediment-dwelling organisms are not expected to occur, respectively. The probable effects concentration (PEC) is a sediment concentration above which adverse effects are likely to occur on sediment-dwelling organisms. At the 11 Tar Creek and tributary sampling locations, all the samples exceeded the applicable TBC or TEL for cadmium, lead, and zinc. For cadmium and lead, 73% of the samples exceeded their respective PBCs, while 91% of zinc samples exceeded the zinc PEC. At the four Spring Branch sampling locations, all of the samples exceeded their appropriate TEC, TEL, and PRC for cadmium, lead, and zinc. At thc six Willow Creek and tributary sampling locations, all the samples excceded tbe applicable TBC and TEL for cadmium, lead, and zinc, while the percentage of samples exceeding the PBC for these three metals were 67%, 67%, and 100%, respectively. Finally, the USGS proposed the lowest detected concentrations of cadmium, lead, and zinc (0.6, 20, and 100 mg/kg, respectively) as background or pre-mining sediment concentrations. These proposed background concentrations are close to the TECs proposed as sediment concentration guidelines by MacDonald et. al. (2000) for cadmium, lead, and zinc, which are 0.99 ppm, 35.8 ppm, and 121 ppm, respectively. The Tar Creek, Spring Branch, and Willow Creek sediment results all exceeded the TECs and estimated background concentrations, A USGS study focusing on sediment loads to Empire Lake (an impoundment of the Spring River) will be forthcoming later this year and is expected to reflect trends similar to the ones described above.

Another USGS study investigated metals loading from mine waste leaching and mine discharge into Tar Creek at a portion of the Tar Creek Superfund Site. Although the report has not been finalized, USGS personnel recently gave a presentation on the investigation which was conducted during low flow summer conditions. Overall, the findings indicated that significant loads of cadmium, lead, and zinc to Tar Creek resulted from chat over a period of minimal rainfall. Preliminary results indicate that metal-contaminated water seeps out of the large mine waste piles into Tar Creek even during periods of minimal rainwater recharge, adding greatly to the surface water contamination. A copy of the finalized report will be added to the AR upon its completion. In summary, mining operations and mine waste have impacted subsite surface water and sediment and present a substantial hazard to aquatic life and certain avian species.

Public and Local Government Input: Historical and recent community feedback on the remedy at both the Treece and Baxter Springs subsites has indicated approval and urged remediatian of the remaining mine waste, Historically, several citizens residing in the Baxter Springs and Treece subsites have contactcd the EPA expressing a desire for the remaining mining wastes to be addressed. Elected officials representing the cities of Baxter Springs and Treece have also contacted the EPA with requests to address the remaining mining wastes in and around these communities. Recently, citizens of Treece, Kansas, have expressed a strong interest to be relocated from this community based on the probability of similar actions being conducted across the state line in Oklahoma mostly due to possible underground mine collapse. In summary, there is strong local support from citizens and government officials for the remediation of the remaining wastes and there is a recent desire of citizens in Treece to be relocated. These policy and programmatic changes (in addition to new scientific information) represent a strong case for addressing all remaining mine waste at the Baxter Springs and Treece subsites. The social and physical hazard aspects of citizen relocation are not subject to the EPA's environmental mandate.

H. SUMMARY OF SITE RISKS

Ecological Risks

Ecological risks constitute the primary site risks and are present due to elevated levels of heavy metals in mine waste, soils, sediments, groundwater, and surface water within the subsites. Zinc, lead, and cadmium are the major COCs for ecological receptors and also represent the principal threats. The primary exposure scenario consists of heavy metals uptake by ecological receptors such as fish, macro-invertebrates, birds, and other terrestrial species. Ecological receptors are exposed to heavy metals primarily by ingestion of mine waste, soils, sediments, surface water, vegetation, and prey as well as inhalation of toxic dusts. Hazard quotients (a measure of ecological risk) have been calculated in many formerly mined areas of the TSMD and they indicate the presence of ecological risks (hazard quotient values > 1).

Based on the RI for OU-3 and OU-4, the average concentrations of cadmium, lead, and zinc in chat mine waste are 45 ppm, 750 ppm, and 8,056 ppm, respectively. The average concentrations in tailings are 124 ppm cadmium; 3,800 ppm lead; and 21,600 ppm zinc. Additionally, the maximum values of cadmium, lead, and zinc in chat mining wastes are 89 ppm; 1,660 ppm; and 13,000 ppm zinc zespective1y, while the maximum values for tailings are 540 ppm cadmium; 13,000 ppm lead; and 52,000 ppm zinc. Elevated levels of these three heavy metals in surface water and stream sediment at the subsites and their comparison to sediment guidelines have been documented (as summarized previously in Section 6) and illustrate significant risks to ecological receptors.

Human Health Risks

Human health risks are present due to elevated levels of heavy metals in mine waste, soils, sediments, groundwater, and surface water within the subsites. Lead and cadmium are the main COCs for human health risk. The primary exposure route for human health risks is ingestion of lead-contaminated residential yard soils by children up to six years of age. Other human exposure routes include outdoor activities in areas of mine waste, consumption of impacted groundwater or surface water, and consumption of contaminated fish or other species.

As documented in the KDHE's TMDL report for the Spring River watershed, mean metal concentrations for cadmium, lead, and zinc in asian clams in the Spring River at Baxter Springs were 2.0 ppm, 7.4 ppm, and 550 ppm, respectively, The high metal concentrations have resulted in a shellfish consumption advisory for the Spring River to be issued by KDHE in 2006. Under current site scenarios, the two primary human health risks are children residing in the three new residences recently built on or near mine waste and potential future residents who may construct homes in mine-waste areas or conduct outdoor activities in these locations.

It is EPA's current judgment as the lead agency that the selected alternative identified in this ROD Amendment is necessary to protect public health and welfare of the environment from actual or threatened releases of hazardous substances into the environment. This view is also held by KDHE, the support agency.

I. REMEDIAL ACTION OBJECT1VES

Remedial Action Objectives (RAOs) are cleanup goals that are addressed by reducing or eliminating contaminants or exposure routes. RAOs are media-specific and are provided in Table 2. There are six total RAOs: two for source materials, two for soils, and two for surface water.

The soils and source materials RAOs specify the prevention of ecological and human health risks associated with the exposure to soils and mine waste containing heavy metals. These RAOs are met by relocating, consolidating, subaqueously disposing, and capping all surface accumulations of soils and mine waste. The contaminated media will be rendered inaccessible by human or ecological receptors and thus the RAO will be satisfied.

The surface water RAOs specify the prevention of ecological risks by reducing the exposures related to metals-contaminated surface water. These RAOs, in combination with the soil and source materials actions, will reduce or eliminate levels of heavy metals in surface water.

For OU-3 and. OU-4, the selected alternative is expected to accomplish a reduction of. cadmium, lead, and zinc loading on the Spring and Neosho Rivers as well as their tributaries (Willow Creek, Spring Branch, Tar Creek, and their tributaries). Moreover, the complete removal of source material eliminates ecological and human health risk pathways resulting from the mine waste and reduces the degradation of groundwater via source removal and minimization of run off infiltration. With the exception of a few residences recently constructed on and near mine waste in Treece, human exposure via residential soils in the proximity of the subsites is not currently at an unacceptable level due to past remedia1 actions, and drinking water is supplied by municipal water systems with wells in the deep pristine aquifer. The public will continue to be encouraged to use a public water supply for domestic needs. For the most part, the human health and ecological risks are associated with nonresidential mine waste. The selected alternative includes new additional institutional controls to augment the existing controls specified on a county-wide basis in a prior ROD. The selected alternative endorses the continued implementation of the previously proposed institutional controls.

J. PREFERRED REMEDIAL ALTERNATIVE

Eight basic cleanup alternatives – with a total of 18 individual alternatives – were evaluated in the historical 1993 Baxter Springs and Treece FS in order to select the optimum approach to address site risks, Although eight candidate alternatives were initially carried forward for a more detailed assessment of their viability, none were selected. Instead, the EPA, state of Kansas, and PRPs came to an agreement after the submittal of a PRP FS Addendum to implement an approach known as Alternative 3b. A detailed description of this remedy and its subsequent implementation are documented in the 1997 ROD and final RA reports for both subsites. The 1997 ROD addressed all metals-impacted residential properties at the Baxter Springs and Treece subsites as well as a significant portion of the surficial mine waste and outwash tailings at the Baxter Springs subsite. The 1997 ROD did not address the surficial mine waste at the Treece subsite. Figure 5 shows the surficial mine waste addressed in Baxter Springs under the 1997 ROD. Table 3 contrasts the 1997 ROD remedy with the current ROD Amendment.

While this remedy was successfully implemented, based on new and additional information obtained in the past five years (Section 6), as well as being consistent with other remedial actions at the site as well as Oklahoma's Tar Creek Superfund Site, the EPA has determined that it is now appropriate to address the remaining source materials at OU-3 and OU-4 to fully protect human health and the environment. The cleanup alternative from the FS which is most similar to EPA's selected alternative is Alternative 8A. The EPA's selected remedy will be designated Modified Alternative 8A and is summarized below:

Modified Alternative 8A: Complete Source Removal, Consolidation, Capping and On-Site Disposal:

This remedy addresses all surficial mine waste by conventional excavation and/or consolidation, and multi-layer (borrow clay and topsoil, together approximately 18-inches thick) capping of excavated mine waste in addition to select subaqueous disposal of the mine waste. Wastes to be addressed include all mining and mill wastes that are actively contributing metals to streams or potentially threatening human or ecological receptors. The mine waste will be consolidated and capped above the ground surface, capped in place, or disposed in collapses, shafts, or pits (subaqueous disposal) and capped. Erosion and drainage controls will be utilized during implementation to limit short-term impacts, Although the selected alternative predominantly utilizes conventional consolidation and capping methods for source disposal, select mine subsidence features may be used as permanent repositories for excavated mine waste if conditions are deemed to be favorable. However, subsidence pit disposal will not be employed as a remedy near streams or floodplains to ensure unknown groundwater hydrologic impact to surface water does not occur. Before and during the remedy implementation period, subsite chat sales conducted under Best Management Practices (BMPs) will be highly encouraged. The overall approach is to concurrently address nonmarketable mine waste by remediation while encouraging the sale and use of commercial mine waste. Lastly, a previously proposed institutional controls program augmented by new approaches will be implemented, addressing the following elements: restrictions on new residential development in mine waste areas, restrictions on the drilling and installation of new domestic water supply wells, encouragement of local citizens to utilize existing water districts for domestic needs, and the implementation of

casing integrity standards and oversight for the design and construction of new deep aquifer supply wells. This remedy addresses the large quantity of source material remaining at OU-3 and OU-4. After implementing the selected alternative, a substantial amount of currently inaccessible land will meet the objective of unlimited use and unrestricted exposure. Additionally, the selected alternative will eliminate surface water and sediment contamination from surficial run off from mine waste. More details on the selected alternative are included in Section M.

The selected alternative is presented in this ROD Amendment without additional written alternatives for several reasons. First, a number of alternatives for these subsites were evaluated previously in the FS, FS Addendum, 1997 Proposed Plan, and 1997 ROD. With regard to the source material, the alternatives differed only in the amount of mine waste removed. In essence, the selected alternative is the same approach with similar costs as Alternative 8A in the FS. Additionally, there is no new remedial technology available since the FS was completed to effectively address the source material. Excavation and consolidation, capping in place, and subaqueous disposal remain the three most effective and common approaches to remediating large amounts of mine waste. Moreover, as indicated earlier in Section 6, recent information indicates continued risk to ecological receptors and, to a lesser degree, to human health even after remedial actions were conducted at OU-3 and OU-4. In particular, while the partial source reduction appears to have reduced some ecological risk as evidenced by overall decreased surface water COC concentrations, unacceptable ecological and human health risk remains at both subsites. Post 1997 ROD data and information indicate that anything less than mine waste removal would continue to represent a threat to receptors. Thus, only one alternative – the selected alternative – is presented in this ROD Amendment.

The main goal of the caps (for mine waste disposed of either subaqueously or left in place) is to prevent exposure to the elevated COC concentrations in the mine waste in perpetuity. The cap must be stable enough to withstand erosional forces such as water and air. A secondary function of the cap is to reduce additional COC loading to the groundwater, even though the shallow aquifer groundwater, chemical-specific ARAR was waived in the 1997 ROD. The EPA considers it inappropriate for the selected alternative to result in additional groundwater contamination. Other considerations include minimizing O&M costs, and securing state and local community acceptance.

To meet these goals, a cap needs to be constructed of appropriate material and be of sufficient thickness. As described in the selected alternative, the components and thickness of the caps are generally the result of previous experience at the Site. Previously at OU-5 (Galena Surface Water/Groundwater), mine waste was covered on a per-acre basis, resulting in an approximate three- to six-inch cap made of a mixture of lime, compost, and prairie hay mulch. After attempting to seed the cap, vegetation failed to take root at approximately 300 acres of the total 900 acres, resulting in excessive O&M costs to repair the cap, borne by the state of Kansas. Alternatively, during the partial source reduction at OU-3, warm-season native grasses were successfully seeded on a cap of approximately six inches of topsoil overlying one foot of clay. This clay for the mine waste caps at OU-3 came from nearby sedimentation basins during their construction. Thus, the sole cost related to the clay is its hauling from its point of origin to the cap. Additionally, OU-3 remedial design work indicates that the 18-inch clay and topsoil layers eliminate greater than 95% of water infiltration through the metal-impacted mine waste to the groundwater. Furthermore, the cap construction at OU-3 has resulted in minimal O&M costs. Consequently, the cap as outlined in the selected alternative is a product of previous site

experience. Moreover, future repair and remedial work at OU-5 uti1izes the 18-inch cap criteria. Also, all mine waste remediation at OU-6 (Badger, Waco, Lawton, and Crestline subsites) of the Site will use the 18-inch criteria pursuant to the 2004 OU-6 ROD.

In addition to this experience, two other reasons make an 18-inch cap appropriate. First, a stable cap generally requires vegetation to resist erosional forces such as water or wind. In response, a mix of warm-season native grasses was developed for mine waste caps in the TSMD which required minimal mowing, thrived in the Kansas climate, and blended well with the area aesthetically. Successfully used at the previous OU-3 partial source reduction remedy, the grasses optimal root zone is approximately 18 inches. The cap correspondingly will need to be that approximate depth. Secondly, even at the Baxter Springs subsite's caps, downcutting due to run off was observed along some edges of the cap to approximately one foot, requiring O&M expenditures, Therefore, a cap with a thickness greater than one foot is needed to maintain its protectiveness. It should be noted that the state of Kansas would greatly prefer a two-foot cap, similar to those mandated for its nearby coal mining sites, but will accept an 18-inch thick cap as part of the selected alternative. Finally, it should be noted that in general, the community has expressed satisfaction with the previous caps, particularly for their appearance as a prairie landscape. As one of the two NCP modifying criteria, community acceptance of mine waste caps (which will remain in the community indefinitely) is important,

With the exception of the shallow aquifer groundwater chemical-specific ARARs (previously waived in the 1997 ROD), this alternative is expected to meet ARARs and be protective of human and ecological receptors. This ROD Amendment retracts the TI waiver for surface water, chemical-specific ARAR (which was part of the 1997 ROD) for several reasons. First, according to the 2005 Five Year Review by Region 6 and the state of Oklahoma, these government agencies are involved with efforts to complete an RI/FS, and human health and ecological risk assessments for OU-4 (mine wastes) at the adjacent Tar Creek Superfund Site. It is expected that a ROD for addressing ths mine waste will be issued by Region 6 in the future. Therefore, it is appropriate that Region 7 also issue a decision document (e.g., this ROD Amendment) regarding the remaining upstream mine waste. Secondly, in 1997, the state of Kansas supported the TI waiver based on the lack of downstream mine waste cleanup actions at the Tar Creek Superfund Site. Recently, the state of Kansas has changed this view on the OU-3 and OU-4 mine waste cleanups, mostly due to the recent Region 6 and state of Oklahoma investigations. Finally, additional investigations by the USGS, the publication of the TMDL by the state of Kansas, the depth to the shallow groundwater aquifer, and the overlying shale/ nonyielding limestone all indicate that significant surface water metal contamination comes from mine waste and not shallow groundwater. Perhaps the most important aspect is the recent scientific findings that indicate the impacts to surface water are predominantly a result of the presence of surficial mine waste. Therefore, Region 7 believes it is now technically practicable under a ROD Amendment to meet the surface water chemical-specific ARARs.

Additionally, the state of Kansas and local governments may need to facilitate land-use controls as part of the long-term O&M components of the completed remedy in order to protect the integrity of the capped mine waste areas and controls on the use of groundwater for consumption. Deed restrictions are a potential method to prohibit future residential development in mine waste disposal areas. The subsite areas are currently rural and used for agricultural purposes, thus lessening the potential future need for deed restrictions and institutional controls.

Finally, the U.S. Department of the Interior has developed its Preliminary Natural Resource Damage Assessment (NRDA) as Natural Resource Trustee for the TSMD. The EPA and the Trustee have different but complementary roles. The EPA is responsible for the development of response actions to protect human health and the environment. The NRDA is used to identify additional actions, beyond the EPA response, to address natural resources, including restoration of habitats or species diversity, or compensation for the loss of injured natural resources. The EPA will coordinate with the Trustee so that the remedy, to the extent possible, will enhance restoration of habitats and species diversity.

K. EVALUATION OF THE ALTERNATIVE

The NCP requires the EPA to evaluate the selected alternative against nine criteria. Any selected remedy must satisfy all nine criteria before it can be implemented. The nine criteria are divided into the following groupings: two threshold criteria, five balancing criteria, and two modifying criteria. The two threshold criteria are overall protection of human health and the environment, and compliance with ARARs. Table 4 depicts the ARARs for this action. Generally, alternatives must satisfy the two threshold criteria or they are rejected without further considering the remaining criteria.. The five balancing criteria consist of the following: long-term effectiveness and permanence; reduction in toxicity, mobility, and volume achieved through treatment; implementability; short-term effectiveness; and cost. Lastly, the two modifying criteria consist of state and community acceptance, The modifying criteria were fully evaluated following state and public input as discussed in this document and the Responsiveness Summary (Appendix A).

Threshold Criteria Evaluation

The threshold criteria of overall protection of human health and the environment and ARARs compliance addresses whether a remedy provides adequate protection by reducing, eliminating, or controlling pathway risks through treatment, engineering, and institutional controls in addition to meeting the ARARs of federal and state laws. Compliance with chemical, location, and action-specific ARARs is required unless a site-specific waiver is justified. This site does not justify any additional waivers of any ARARs.

The selected alternative is a modified version of Alternative 8A from the Baxter Springs and Treece FS and is designated as Modified Alternative 8A (Complete Source Removal, Consolidation, Capping, and On-Site Disposal). This alternative will meet the threshold criteria of protecting human health and the environment and complying with ARARs predominantly through the implementation of engineering controls. Excavating, consolidation, capping in place, potential subaqueous disposal, and revegetation of the remaining surficial mine waste will minimize human and ecological (terrestrial/aquatic organisms and birds) risks by engineering methods. Additionally, the characterization of groundwater conditions in areas of potential subaqueous disposal and institutional controls will help maintain protection of the environment and human health. All chemical, location, and action-specific ARARs will be met by the selected alternative other than the shallow groundwater chemical-specific ARAR previously waived under the 1997 ROD. Any risks due to unremediated sediment will be addressed in the future after all site mine waste cleanups are finished.

Balancing Criteria Evaluation

Descriptions of the five balancing criteria include the following: long-term effectiveness and permanence addresses the ability of a remedy to maintain protection of human health and the environment over time, inclusive of residual risks following implementation; reduction in toxicity, mobility, or volume through treatment addresses the degree to which a remedy employs recycling or treatment methodologies to control principal threats; implementability describes the technical and administrative feasibility of implementing a cleanup approach including the difficulty of undertaking additional follow-up actions; short-term effectiveness addresses the time required for implementation and any adverse impacts during implementation, and cost describes the direct and indirect capital costs of the alternative. The balancing criteria are applied to the selected alternative since it satisfies the earlier threshold criteria.

Modified Alternative 8A meets all five of the balancing criteria, The alternative has a high degree of long-term effectiveness and permanence as contrasted to any of the other alternatives proposed in the FS, provided the engineered caps and institutional controls are adequately maintained long term. In cases of subaqueous mine waste disposal, the selected alternative may potentially have a lesser degree of long-term effectiveness and permanence since it is a relatively new disposal approach. A recent pilot study did not conclusively illustrate the long-term effectiveness and permanence of subaqueous mine waste disposal due to ongoing potential concerns related to groundwater impacts. However, the pilot study results appear sufficient enough to potentially employ this remedy in a larger scale remedial application as a technology demonstration or validation approach in areas not near streams. Overall, when the remedy is completed, there will be more land available for unencumbered use. There are anticipated to be minimal risks to human health and the environment following implementation of the remedy.

Modified Alternative 8A has a high degree of contaminant toxicity, mobility and volume reduction through excavation, consolidation, and multi-layer capping. These caps essentially alleviate infiltration which ultimately affects dissolved meta1 concentrations in groundwater and dispersal of contaminants by wind or human agents. Also, the removal of source materials are expected to eliminate significant metals loading and toxicity to surface water and sediment. Additionally, a new technology, – subaqueous disposal – may potentially demonstrate its degree of effectiveness in reducing contaminant toxicity and/or mobility, and will reduce the overall above-ground mine waste volume subject to long-term O&M. Also, encouraged pre- and concurrent remedy chat sales will reduce the volume of source material for remdiation. Although the remedy does not employ treatment, this is consistent with prior large lead site remedies due to the large volume of mine waste dispersed over great areas.

The remedy is easily implemented. Not only does it utilize standard construction equipment but experience in executing all of the remedy components has been gained by employing them at other portions of the Site.

Modified Alternative 8A may have short-term impacts as it requires a long implementation time frame (8-10 years) and involves the excavation and/or consolidation and transportation/movement of large volumes of material (approximately seven million cubic yards – see Table 1). Recent (July 2006) volume estimates of commercially used chat at the Treece subsite indicate that approximately 1.3 million cubic yards have been removed to date.

Implementation of subaqueous disposal may have short-term impacts due to the potential increase in groundwater concentrations of heavy metals. However, erosion and drainage controls used during the implementation are expected to minimize impacts associated with excavation and consolidation of surficial mine waste.

Considering the large size of OU-3 and OU-4, as well as the multi-media nature of the hazards, Modified Alternative 8A is favorable with regard to cost, with estimated capital and O&M costs of approximately $66 million. O&M costs will cover periodic oversight and maintenance of the above-ground caps as well as periodic groundwater monitoring in cases of subsidence disposal. The actual remedy cost may be lower than the projected cost depending on how much chat is sold commercially prior to implementation. A cost estimate has been attached to this document.

Modifying Criteria Evaluation

The two modifying criteria of community and state acceptance are intended to assess the views of both groups regarding the proposed cleanup approach. The state of Kansas is represented by the KDHE and the public is represented by the local affected community. Views of the state are well known since the KDHE has been involved in many aspects of the project to date. Community views are fairly well known based on interactions with local land owners, local government officials, and similar situations at nearby subsites of the Site that historically have been through a similar process.

Modified Alternative 8A is expected to be acceptable to the public and is known to be acceptable to the state of Kansas. The public historically has expressed a desire for environmental remedies that address all surficial accumulations of mine waste which this remedy meets. Historically, local elected officials representing the cities of Baxter Springs and Treece have contacted the EPA expressing desire for the remediation of mine waste in these communities. Moreover, many local citizens from these areas have also contacted the EPA with similar input. Recently, citizens of Treece, Kansas, have expressed a strong interest to be relocated from this community based on the probability of similar actions being conducted across the state line in Oklahoma mostly due to possible underground mine collapse. However, as explained more fully in the Responsiveness Summary, the social and physical hazard aspects of citizen relocation are not subject to the EPA's environmental mandate. In summary, there is local support from citizens and government officials for the remediation of the remaining mine waste and there is a recent desire of citizens in Treece to be relocated. The state of Kansas has recently expressed a similar desire that all surficial mine waste be addressed and this preference is also met by the remedy. The KDHE has reviewed and concurred with this ROD Amendment,

L. PRINCIPLE THREAT WASTES

According to the Office of Solid Waste and Emergency Response's (OSWER) Directive 9380.3-06FS (A Guide to Principal Threat and Low Level Threat Wastes), "Principle threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur." Based on this definition, mine waste at the subsites does not appear to be principal threat waste. Overall, containment will be employed at this site due to

the widespread nature of the contaminants, large volumes of materials, and effectiveness of nontreatment technologies (excavation, consolidation, capping, revegetating, subaqueous disposal) for mine waste remediation. It should be noted that subaqueous mine waste disposal may constitute treatment if altered geochemical conditions are established. This aspect of the remedy will be assessed over time.

M. SUMMARY OF THE SELECTED ALTERNATIVE

The selected cleanup approach for addressing the mine waste at OU-3 and OU-4 is an updated version of Alternative 8A which is designated as Modified Alternative 8A (Complete Source Removal, Consolidation, Capping and On-Site Disposal). One modification to the original Alternative 8A includes commercial chat sales. Modified Alternative 8A addresses all mine waste accumulations and allows flexibility with regard to capping in-place, consolidation and capping, or subaqueous disposal, It is an engineering solution and requires the use of multi-layer (soil/clay), infiltration-preventing cap design. Risks will be reduced in the most effective manner due to the above-mentioned flexibility, based on engineering efficiencies.

The cleanup levels for addressing contaminated soil, particularly soil underlying and surrounding chat and tailings, are based on the EPA-derived ecological PRGs and are 10 ppm cadmium, 400 ppm lead, and 1,100 ppm zinc. The derivation of these cleanup levels based on the ecological risk evaluation is included in the AR.

The cleanup levels for addressing surficial, nonresidential mine waste will be the same as those for contaminated, nonresidential soil, specifically: 10 ppm for cadmium, 400 ppm for lead, and 1,100 ppm for zinc. The EPA is applying the soil cleanup levels to the mine waste because it acts as a source to the soil. The wide body of historical site data/investigations and associated cleanups has shown that the mine waste accumulations present human health and ecological risks. Samples of select chat and tailings deposits representative of the mine waste were collected during the RI and indicated greatly elevated levels of the COCs. The minimum concentration of at least one COC in these samples was greater than the ecological soil cleanup levels previously proposed. It is expected that all the surficial mine waste will fail to meet the cleanup levels and will require remediation. The mine waste volumes, aerial extent, and location historically have been clearly identified and mapped in the FS via aerial photography and fieldwork. The mine waste is generally distinctive from the surrounding and underlying soil due to different grain sizes and color and it is easily identifiable in the field.

Surface water cleanup levels for the subsites will be the KDHE Chronic Aquatic Life Criteria for cadmium, lead, and zinc. Sediment and surface water at the Baxter Springs subsite will be addressed under OU-2 (Spring River Basin). Sediment at the Treece subsite will be addressed after all mine waste cleanups have been conducted to remove source contamination to the sediment. It will be dealt with either as part of the Spring River Basin (OU-2) or separately. Air monitoring will not be conducted during remedial activities at OU-3 and OU-4. This determination is based on air monitoring results concurrent with previous excavation and capping remedial actions at OU-5 and OU-7 which did not indicate releases of COCs to the air.

The specific elements of preferred Modified Alternative 8A include the following components for the Baxter Springs and Treece subsites, Figures 2, 3, and 4 show the mine waste discussed below:

- Excavate, consolidate, and/or cap surficial mine waste. Mine waste in heavily forested, thickly vegetated areas will not be subject to excavating, consolidating, or capping. Whether to excavate, consolidate, or cap mine waste in-place will largely depend on actual field conditions and will be further detailed during the RD phase, In general, however, the EPA envisions that mine waste in three circumstances will be excavated and consolidated with other mine wastes. The first scenario involves mine waste that is small in size, either volumetrically or aerially. Removing this mine waste will free more land for unlimited use and unrestricted exposure as well as reduce O&M costs. Often, excavated chat piles or isolated tailings/chat piles will fall into this category. The second mine waste category for probable excavation and consolidation is outwash tailings which are in streams or drainages. Removing this mine waste will stop further contamination from the source material to stream sediment and surface water. The third probable scenario for mine waste excavation and consolidation is mine waste near streams. Removing this mine waste from the erosional reach of streams will prevent their further contamination. In general, it is anticipated that selective staging of the mine waste removal/capping will occur based on proximity to residences and suburban structures (e.g, baseball field), and encouragement of responsible chat sales.

- Chat accumulations or piles, and excavated chat area, footprints at the Baxter Springs subsite to be addressed include BC-1, BC-2, BC-4, RC-19, BC-20, BC-22, RC-23, BX-1 through BX-10, BX-12, BX-13, BX-15 through BX-20, BX-23, BX-24, BX-26 through BX-29, BX-30, and BX-32 through BX-41. Tailings (fine grained mine waste) at the Baxter Springs subsite covered by this remedy include BT-1, BT-2, BT-3, BT-4, BT-10, BT-11, BT-13, BT-19 through BT-25, and BT-27 through BT-30. Outwash tailings at the Baxter Springs subsite that will be addressed by this remedy include BOW-3 and BOW-4, English 0, a mixture of chat, tailings, and excavated chat within the Baxter Springs subsite, will also be remediated.

- Chat piles and excavated chat area footprints at the Treece subsite to be addressed include TC-2 through TC-4, TC-7, TC-9, TC-15, TC-16, TC-20, TC-21, TC-23, TC-27, TC-29, TC-37, TC-45, TX-2, TX-4, TX-5, TX-7, TX-10 through TX-12, TX-14, TX-16, TX-18, TX-20 through TX-25, TX-27, TX-29 through TX-33, TX-39, TX-40, TX-42 through TX-47, and TX-59. Tailings at the Treece subsite covered by this remedy include TT-l, TT-5, TT-6, TT-8, TT-10 through TT-14, TT-17 through TT-19, TT-21, TT-22, TT-22N, TT-24 through TT-26, TT-28 through TT-33, TT-35, TT-36, TT-38, TT-41, TT-42, TT-44, and TT-45. Outwash tailings at the Treece subsite that will be addressed by this remedy include TOW-1 through TOW-5.

- Encourage source reduction via responsible chat sales before and during remedy implementation. The EPA plans to meet with chat owners to discuss responsible chat sales and provide them with further information on chat sales. The EPA will also encourage any state and local programs with authority to enforce appropriate BMPs to ensure environmentally protective chat sales. The EPA will also provide its February 2003 Mine Waste Fact Sheet to chat owners, which indicates acceptable and nonacceptable uses of mine waste.

- Potentially utilize subaqueous mine waste disposal and post-remedial action groundwater monitoring. However, subaqueous mine waste disposal will not be employed as a remedy near streams or floodplains.

- Cap subsidence pits, consolidation areas, tailings impoundments, and in-place chat/tailings areas utilizing topsoil and clay caps with a minimum total thickness of 1.5 feet. The use of other materials such as fly ash in conjunction with soil is acceptable pending a successful assessment of viability.

- Recontour and revegetate all disturbed areas and facilitate drainage and erosion controls. Construct sedimentation basins, detention ponds, dikes, berms, and swales to the extent necessary to control run-on and run-off.

- Conduct O&M after the source reduction activities which will include at least inspections of the soil/clay caps, select surface water monitoring in and downstream of the sedimentation basins, and, if deemed applicable, groundwater monitoring in areas of subaqueous disposal.

The following component is covered by the existing 1997 ROD; however, it has been updated with potential new approaches to achieve the goals:

- Adopt previously proposed institutional controls addressing the following elements: restrictions on new residential development in mine waste areas, restrictions on the drilling and installation of new domestic water supply wells, encouragement of local citizens to utilize existing water districts for domestic need, and the implementation of casing integrity standards and oversight for the design and construction of new deep aquifer supply wells. These county-wide institutional controls are included in other Site decision documents. New approaches include working with the state of Kansas to utilize state authorities in assisting with the implementation of institutional controls.

Based on the information currently available, the EPA and the KDHE believe the selected alternative meets the threshold criteria. and provides the best balance of tradeoffs among historically suggested alternatives with respect to the balancing and modifying criteria. The EPA expects the selected alternative, Modified Alternative 8A, to satisfy the following statutory requirements of CERCLA section 121(b): (1) be protective of human health and the environment, (2) comply with ARARs (or justify a waiver), (3) be cost effective, (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and (5) satisfy the preference for treatment as a principal element or explain why the preference for treatment will not be met.

As the support agency, the KDHE has been consulted in the preparation of this ROD Amendment and has provided formal concurrence for the selected alternative in this ROD Amendment. The USFWS also supports the cleanup actions specified in this ROD Amendment.

An unknown aspect of the remedy is the permanence associated with subaqueous disposal of mine waste. In particular, metals could possibly be released from the mine waste to the shallow aquifer groundwater, The historical pilot study conducted at the Waco subsite has not conclusively demonstrated the expected geochemical modifications; however, monitoring is continuing and the literature supports the possibility of achieving geochemical changes (anaerobic conditions). Based on the uncertainties stemming from the pilot study at the Waco subsite, there is a possibility of future groundwater impacts. However, subaqueous mine waste disposal technology is considered an alternative treatment technology that may prove useful at

many future projects. The potential environmental gains resulting from this alternate technology, coupled with the complete surface protectiveness and return of land to productive agricultural or residential use, has factored into the EPA's decision to study and potentially implement this technology on a remedial scale. While this relatively new technology is expected to be promising, it will not be used under certain hydrogeologic conditions such as locations exhibiting a very permeable groundwater system with large gradients, or near streams or floodplains. Given the long implementation time frame (8-10 years), the EPA expects to evaluate the viability and potential limits of subaqueous disposal during the RA.

N. STATUTORY DETERMINATIONS

The EPA's primary legal authority and responsibility at Superfund sites is to conduct response actions that achieve adequate protection of human health and the environment. Section 121 of CERCLA also establishes other statutory requirements and preferences that include the need for federal and state ARARs compliance for selected remedial actions in addition to cost effectiveness and the use of permanent solutions and alternative treatment technologies or resource recovery technologies, to the maximum extent practicable. Additionally, the statute includes a preference for remedies that reduce the mobility, toxicity, and volume of contaminants and include treatment. The following sections discuss how the selected alternative meets these statutory requirements.

Protection of Human Health and the Environment

The selectcd remedy will protect human health and the environment by achieving the RAOs through engineering measures. The institutional controls components of existing site RODs will also complement the engineering controls specified by the selected alternative in terms of protecting human health.

Ecological risks resulting from exposure to mine waste, heavy-metals-impacted prey and food sources, and mining-impacted surface waters will be addressed by the excavation, consolidation, and capping of or subaqueous disposal of mine waste. Surficial mine waste will no longer be present and thus will be unavailable for uptake by ecological receptors or to act as a source to other media.. The ecological risks at OU-3 and OU-4 will be addressed by engineering controls as specified in the Summary of the Selected Alternative (above in Section M).

Human health risks resulting from the exposure to mine waste via the importation and use of the uncontrolled wastes in residential scenarios, trespassing in areas of mine waste accumulations, and residential construction in or near mine waste areas will be prevented by the physical relocation, consolidation, subaqueous disposal, and capping requirements under the selected alternative. Mine waste will no longer be present at the surface, and as such, the existing and potential human health risks will be eliminated by engineering controls. O&M requirements for the capped areas will also serve as controls on future use. The institutional control components of existing site RODs, when fully implemented, will limit or control residential development in or near mine waste areas and also control the drilling and use of new water supply wells in mined areas.

Potential groundwater risks to human health will be addressed by institutional controls also including, as mentioned previously, restrictions on the drilling and installation of new domestic water supply wells and the implementation of casing integrity standards and oversight for the design and construction of new deep aquifer supply wells. Additionally, the selected alternative's potential groundwater monitoring will assist in the evaluation of the effectiveness of subaqueous mine waste disposal.

Compliance with ARARs

In general, selected alternatives are expected to comply with ARARs unless waivers are granted. Under the 1997 ROD, a TI waiver was employed for the chemical-specific ARARs for the shallow aquifer groundwater and surface water, The TI waiver for the shallow aquifer groundwater is maintained by this ROD Amendment. However, the TI waiver for surface water at the Treece subsite is being removed as the EPA believes the selected alternative will meet chemical-specific ARARs for surface water as explained below. The selected alternative is expected to meet all additional chemical-, action-, and location-specific ARARs.

In general, chemical-specific ARARs provide health- or risk-based concentration limits for contaminants in various environmental media such as sediment, groundwater, and surface water. The chemical-specific ARARs for groundwater and surface water, and the risk-based criteria for surficial mine waste are discussed below:

- Safe Drinking Water Act (SDWA) – 42 United States Code (U.S.C,), National Primary Drinking Water Standards, Maximum Contaminant Levels (MCLs), 40 Code of Federal Regulations (CPR), Part 141; Technical Impracticability Waiver for Groundwater ARARs, Cherokee County Superfund Site, Region 7 Record of Decision for OU-3 and. OU-4 of the Cherokee County Site, August 1997; Kansas Safe Drinking Water Act; and the Kansas Administrative Regulations (K.A.R.) 28-15-13 for Safe Drinking Water. MCLs are standards promulgated for the protection of public drinking water supplies and these levels, in addition to the Kansas standards, are relevant and appropriate cleanup goals. The upper and lower aquifers at the site are and/or could be used for drinking water purposes. The following depicts the MCLs established by the SDWA and Kansas standards for lead aud cadmium: lead action level at the tap = 15 parts per billion (ppb); cadmium MCL = 5 ppb. These are applicable, relevant, and appropriate requirements for this response action.

- Clean Water Act (CWA) – The CWA, 33 U.S.C., requires states to establish surface water quality standards that are protective of human health and the environment. Many streams in the subsites are classified under the Kansas Standards, K,A.R. 28-16-28b et seq., and are subject to these criteria. The Kansas Standards require that corrective actions be implemented to restore the designated uses of impaired surface waters as well as the return of original water conditions [K.A,R. 28-16-28(i)g]. These standards are applicable, relevant and appropriate requirements for this response action.

- Resource Conservation and Recovery Act (RCRA); Kansas Hazardous Waste Management Act (KSA 65-3430 et seq., K.A.R 28-31-1 to 28-31) – The RCRA and Kansas Hazardous Waste Management Act set forth a number of standards for the identification and handling of mine wastes at the sites, and are, therefore applicable, relevant, and appropriate requirements for this response action.

In genera1, location-specific ARARs establish restrictions on permissible concentrations of contaminants or establish criteria for conducting actions in sensitive locations such as flood plains, wetlands, streams, and areas of critical habitat. The location-specific ARARs are discussed below:

- The Endangered Species Act (16 U.S.C., Section 1531, 50 CFR Part 200, 30 CPR Part 402) and the Kansas Non-game and Endangered Species Conservation Act, (KSA 32-501) – Due to the presence of several federal and state threatened and endangered species at the subsites, the Region intends to initiate the appropriate consultation processes. Threatened and endangered species, in addition to the habitat that supports these species, require protection and conservation, Moreover, consultation and coordination with the USFWS and the state of Kansas will facilitate compliance with these requirements.

- The Fish and Wildlife Coordination Act (16 U.S.C., 40 CFR); and Fish and Wildlife Conservation Act, 16 U.S.C., Sections. 2901-2912 – Due to actions anticipated at the subsites which may affect the habitat of fish and wildlife, the Region intends to engage in the appropriate coordination process. Federal and state threatened and endangered species, in addition to critical habitat, are present at the OU-3 and OU-4 subsites. Coordination with the USFWS of the U.S. Department of the Interior, in addition to the state of Kansas, will facilitate compliance with this requirement.

- The National Historic Preservation Act (16 U.S.C.), and the regulation at 33 CFR Part 800 – These requirements specify that response actions consider historical properties eligible for or included on the National Register of Historic Places. Although unlikely, some historic mining properties or structures may be deemed eligible and appropriate for preservation. The Region intends to meet the requirements. The subsites are part of the historic TSMD that operated for over 100 years and is nationally and internationally known as a major lead-zinc field.

- The National Archeological and Historic Preservation Act (16 U.S.C., and 36 CFR Part 65) – These requirements specify the recovery and preservation of artifacts which may be discovered during implementation of response actions. Although unlikely, the OU-3 and OU-4 response action may uncover prehistoric, Native American, scientific, or archeological information subject to preservation. The Region intends to meet the requirements.

I general, the action-specific ARARs are based on activities and technologies to be implemented at the subsites. Examples include design, construction, and performance requirements related to conducting the response action. The action-specific ARARs are discussed below:

- The National Pollutant Discharge Elimination System, Effluent Limitations (40 CFR Parts 122, 125, and 440) – The regulation at 40 CFR, Part 440 sets technology-based effluent limitations for mine drainage from mining related point sources. The OU-3 and OU-4 response actions may temporarily generate effluent; thus, the above criteria are relevant and appropriate requirements for the implementation of the OU-3 and OU-4 remedy. However, the substantive requirements of these regulations are expected to be met through engineering controls during implementation of the remedy.

- The Surface Mining Control and Reclamation Act (30 U.S.C., 30 CPR Part 816, Sections 816.56, 816.97, 16.106, 816.111, 816.116, 816.133, and 816.150) – These relevant and appropriate requirements provide guidelines for the post-mining rehabilitation and reclamation of surface mines. These requirements are expected to be met by the implementation of the remedy. Coordination and consolidation with the U.S. Department of the Interior will assist in meeting these requirements.

- Clean Water Act (Section 404, 33 U.S.C., 40 CPR Part 230, and 231) – These requirements prohibit the discharge of dredged or fill materials into wetlands without a permit. The OU-3 and OU-4 remedy could include placing mine waste in water-filled features (pits, mine shafts, and collapses). The Region intends to meet the substantive aspects of these requirements in the implementation of the remedy. The intent of the cleanup is to remove highly eroding wastes from the surface and place these materials in water-filled features below ground in an effort to prevent surface contact by human and ecological receptors as well as surface erosion to streams while attempting to establish anaerobic groundwater conditions that prohibit the migration of metals in the groundwater system.

- Rivers and Harbors Act (Section 10, 33 U.S.C.), and related regulations 33 CFR 320, and Section 404 of the CWA, 40 CFR, Part 125, subpart M – These requirements prohibit the disposal of dredge and fill materials into streams without a permit. The OU-3 and OU-4 remedy includes actions near excavation, consolidation, and disposal of mine waste. The Region intends to meet the substantive requirements of these criteria. The remedy does not include direct placement of material into streams but care must be taken while working near streams to ensure that materials do not wash into these features.

- CWA Water Act, Discharge of Storm Water, 40 CFR Section 122.21, 40 CFR Section 122.26 – These requirements address run-off generated from infiltration events and erosion by streams. The Region intends to meet the substantive requirements of these criteria by reducing water pollution resulting from run-off. The remedy will ultimately remove surficial mine waste materials available for erosion and the implementation of the remedy will be controlled to address run off or releases during construction.

To-be-Considered criteria (TBC) are nonpromulgated criteria, advisories, guidelines, and policies issued by federal or state agencies. TRCs are not ARARs, although they can be used to determine the necessary level of protection of human health or the environment. Examples include risk-based remediation levels such as PRGs. The TBCs are discussed below:

- SDWA, National Secondary Standards, 40 CPR Parts 141 and 143 (Secondary MCLs and MCGLs) – These TBCs are to be considered when implementing the remedy, Secondary MCLs and MCLGs are standards for public drinking water supplies that provide taste, odor, and aesthetic qualities.

- EPA Guidance Document, Cleanup Level for Lead in Groundwater (1/15/93) – This guidance to be considered recommends a final cleanup level of 15 ppb lead in groundwater used for drinking water purposes and is consistent with SDWA. and Kansas criteria. Lead is a contaminant of concern at both subsites. Water districts at both subsites use groundwater from the lower aquifer for drinking water purposes. There is no known drinking water use of the upper aquifer within the subsites.

- Draft Soil Screening Guidance, OSWER Directive 9355.4-14FS, December 1994, EPA/540/R-94/101 and 106; Risk Management Derived Residential Yard Soils Remedial Action Levels for Lead and Cadmium, Region 7 Record of Decision for the Baxter Springs and Treece Subsites (OU-3 and OU-4) of the Cherokee County Superfund Site, August 1997; Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, OSWER Directive No. 93555.4-12, July 14, 1994. Although no residential areas are anticipated in the cleanup, such areas may need remediation and, therefore, these guidelines are to be considered for this response action.

- As part of the process to designate uses of impaired surface waters, as well as the return of original water conditions, the state of Kansas has developed TMDLs for cadmium, lead, and zinc in Tar Creek at OU-4, Although Kansas has also determined TMDLs for the Spring River Basin, of which the Baxter Springs subsite is a part, these will be addressed under OU-2, as mentioned earlier.

- Site Specific Toxicity Reference Values for Aquatic Biota, Region 7 ROD for OU-3 and OU-4 of the Cherokee County Site, August l997 – This requirement sets standards specific to the operable units, aud is an applicable, relevant and appropriate requirement.

- Executive Order on Floodplain Management, Executive Order No. 11988, 40 CFR Sec. 6.302(b) and Appendix A – This is a legally applicable requirement for the response action given the presence of floodplains – especially the Spring River and Tar Creek floodplains – at OU-3 and OU-4. The executive order requires that actions avoid adverse effects and minimize harm to floodplains in addition to restoring and preserving the natural and beneficial values of floodplains to the extent possible. The OU-3 and. OU-4 selected alternative is expected to comply with these requirements as the intent of the cleanup is to ultimately protect floodplains and streams by the removal of surficial mine waste.

- Executive Order 11990, Protection of Wetlands (40 CFR 6, Appendix A) – This order is a legally applicable requirement due the presence of wetlands at OU-3 and OU-4 and it specifies the avoidance, to the extent practicable, of adverse impacts associated with the loss or destruction of wetlands resulting from response activities. The selected alternative is expected to comply with this requirement.

Cost Effectiveness

Modified Alternative 8A (the selected alternative) estimated at approximately $66 million is a cost-effective permanent solution to mine waste impacting the Baxter Springs and Treece subsites of the Site. The remedy relies on conventional engineering methods that are easily implemented and is consistent with previous remedies at other subsites, OU-5 in particular. Since all surficial mine waste at both subsites is fully addressed, it is a permanent solution for all source material and impacted media except for shallow groundwater (waived) and sediment (future cleanup actions) and not subject to excessive future reopening costs or other potential future costs associated with toxic tort lawsuits. Additionally, the response action will return the areas to a more natural condition that may prove beneficial from a natural resource perspective. Other less comprehensive alternatives would leave a large amount of unremediated mine waste with such potential problems as being subject to reopening provisions,

future NRD claims and litigation, and potential toxic tort lawsuits. Additionally, the mine waste not subject to remediation would rely heavily on the institutional controls components of other RODs which have not been enacted to date. These alternatives would not meet ARARs and are not considered optimally protective. Finally, although the exact amount of land returned to unlimited use and unrestricted exposure cannot be quantified currently, after implementation of the selected alternative, a substantial amount of currently inaccessible land will meet this objective and increase the overall value of county land.

Modified Alternative 8A will achieve all RAOs, meet all ARARs, require no additional ARARs waivers, and may provide substantial future monetary gain or benefit by providing toxic tort relief. The remedy will also provide more suitable habitats for natural resources. Modified Alternative 8A is especially cost effective in consideration of the benefits derived in relation to reducing or eliminating future environmental or legal claims under other statutes or laws.

Utilization of Permanent Solutions and Alternate Treatment Technologies

As discussed previously, Modified Alternative 8A is a permanent solution that relies on typical engineering controls. However, the potential unknown aspect related to permanence is associated with the potential release of metals to groundwater resulting from subaqueous mine waste disposal. While the relatively new technology is expected to be promising, it is not applicable under certain hydrogeologic conditions. Coupled with the uncertainties stemming from the recently completed pilot study at the Waco subsite, there is a possibility of future groundwater impacts. However, the novel subaqueous mine waste disposal technology is considered an alterative treatment technology that may prove highly useful at many future projects. The potential environmental gains resulting from this alternate technology, coupled with the complete surface protectiveness and the return of farm land to productive agricultural use, has factored into the EPA's decision to implement this technology on a remedial scale,

Modified Alternative 8A has a high degree of permanence associated with the removal and capping of surficial mine waste and a potentially lesser degree of permanence, subject to potential monitoring of the groundwater component of the filled pits. Modified Alternative 8A utilizes an alternative treatment technology that may prove highly beneficial at future sites. The controlled implementation of a remedial scale project is desirable.

Preference for Treatment

The preference for treatment may or may not be satisfied by Modified Alternative 8A at the Baxter Springs and Treece subsites depending on their location and remedial solution used. At both subsites, the mine waste located in the floodplain of the Spring River or Tar Creek are not appropriate for subaqueous mine waste disposal technology. Thus, this mine waste will be excavated and disposed of outside the limits of these floodplains. The large volume of waste and potentially expensive methods to stabilize or treat mine waste will result in the preference for treatment not being met at this subsite due to technical infeasibility.

Subaqueous mine waste disposal methods at other portions of the subsites may satisfy the preference for treatment pending an analysis of groundwater conditions following disposal. The historical pilot study conducted at the Waco subsite has not demonstrated geochemical modifications that could be considered treatment to date; however, monitoring is continuing and

the literature supports the possibility of achieving geochemical changes (anaerobic conditions) which could be considered a form of treatment. In summary, Modified Alternative 8A may not be capable of satisfying the preference for treatment at the subsites.

Reduction of Mobility, Toxicity, and Volume

Modified Alternative 8A will reduce the mobility and toxicity of the contaminants of concern; however, the volume of mine waste will not be reduced. Mine waste will be excavated, consolidated, disposed, and capped, thus decreasing the mobility and toxicity of these wastes.

Five-Year Review Requirements

The selected alternative is subject to periodic five-year reviews in accordance with Section 121(c) of CERCLA and the NCP. Although mine waste will be removed from the surface, and thus eliminated from potential uptake by human and ecological receptors, the wastes will remain at the site with elevated COC levels below the surface. Potential groundwater impacts stemming from subaqueous mine waste disposal will potentially require monitoring and assessment as part of the five-year review process. Moreover, the O&M requirements for integrity and monitoring of the capped areas will require assessment during the five-year review process in addition to the status of institutional controls that are woven throughout the county by prior RODs.

O. DOCUMENTATION OF CHANGES

No major changes were made to the ROD Amendment in response to input received during the public comment period following the release of the Proposed Plan.

FIGURES

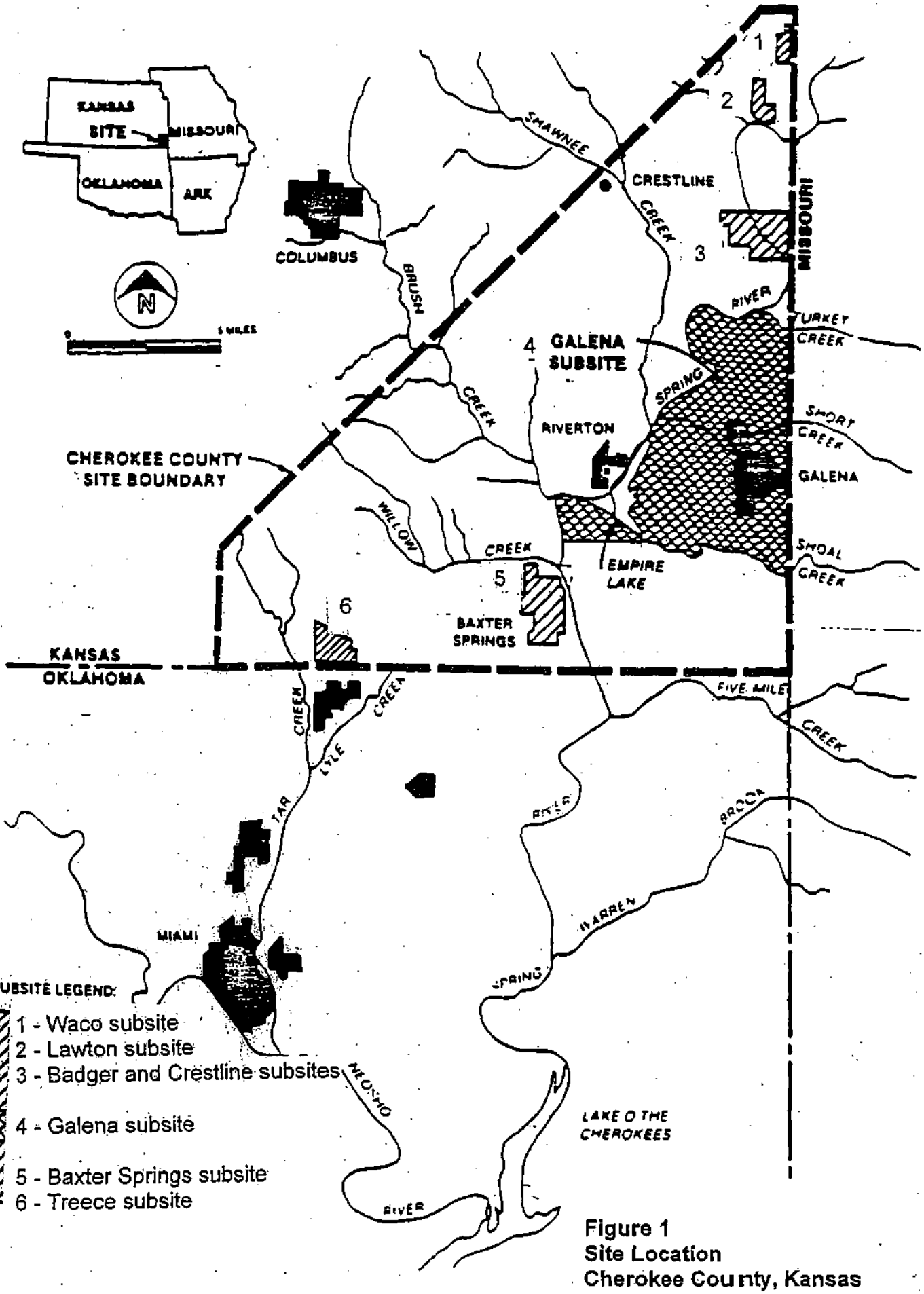
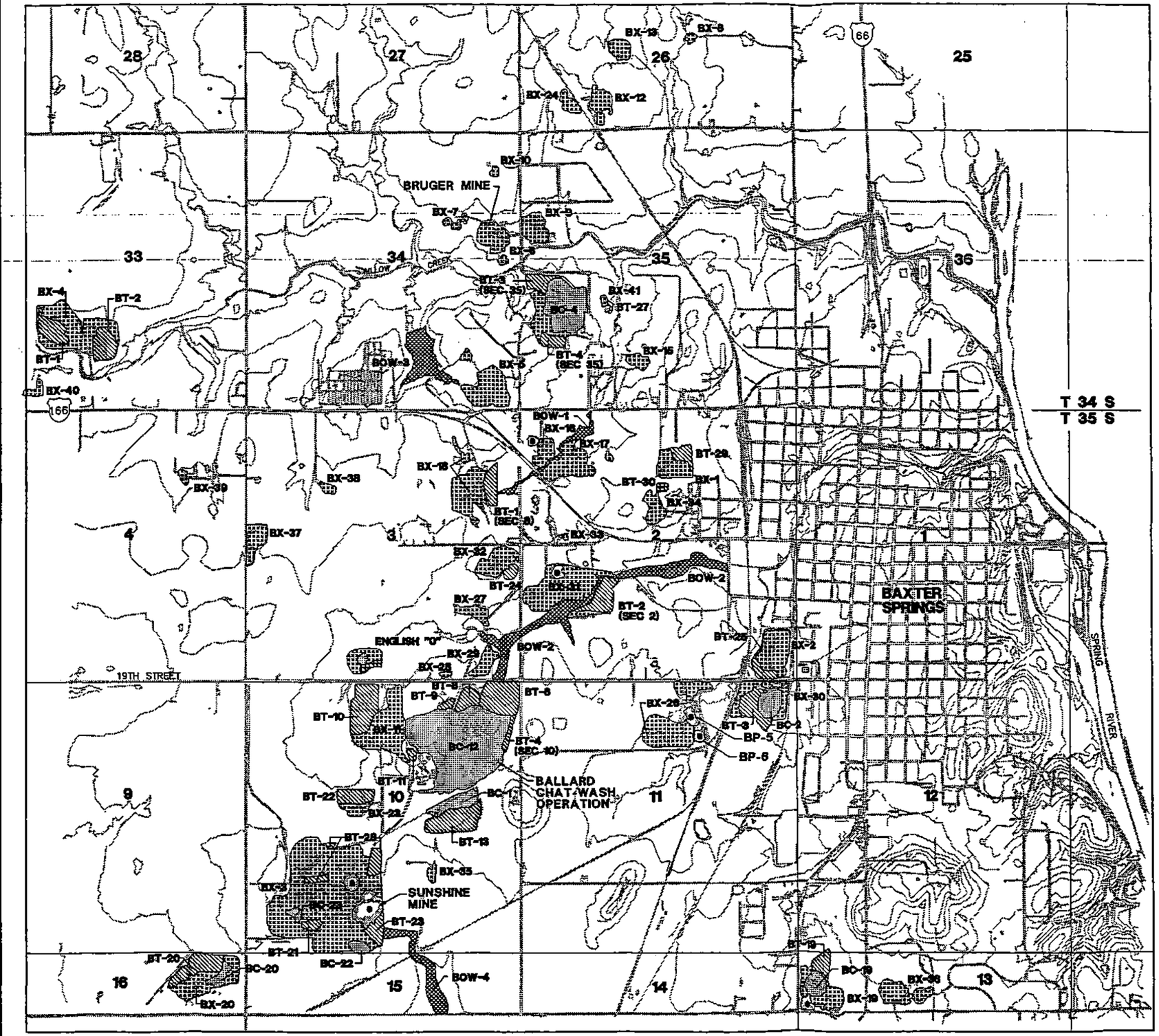


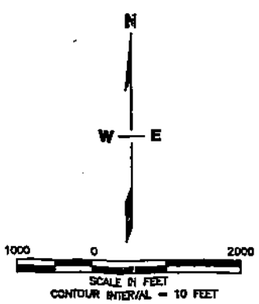
Figure 1
Site Location
Cherokee County, Kansas

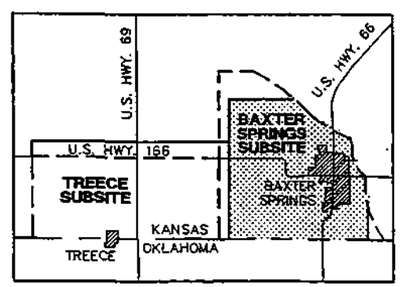


SOURCE: WESTERN AIR MAPS, INC. PHOTOGRAPHED APRIL 3, 1990

LEGEND

- BC-4 — CHAT PILE SHOWING IDENTIFICATION NUMBER
- BT-4 — FLOTATION TAILINGS IMPOUNDMENT SHOWING IDENTIFICATION NUMBER
- BX-2 — AREA OF EXCAVATED CHAT AND/OR MILL-RELATED DISTURBANCE SHOWING IDENTIFICATION NUMBER
- BOW-2 — AREA OF OUTWASH TAILINGS SHOWING IDENTIFICATION NUMBER



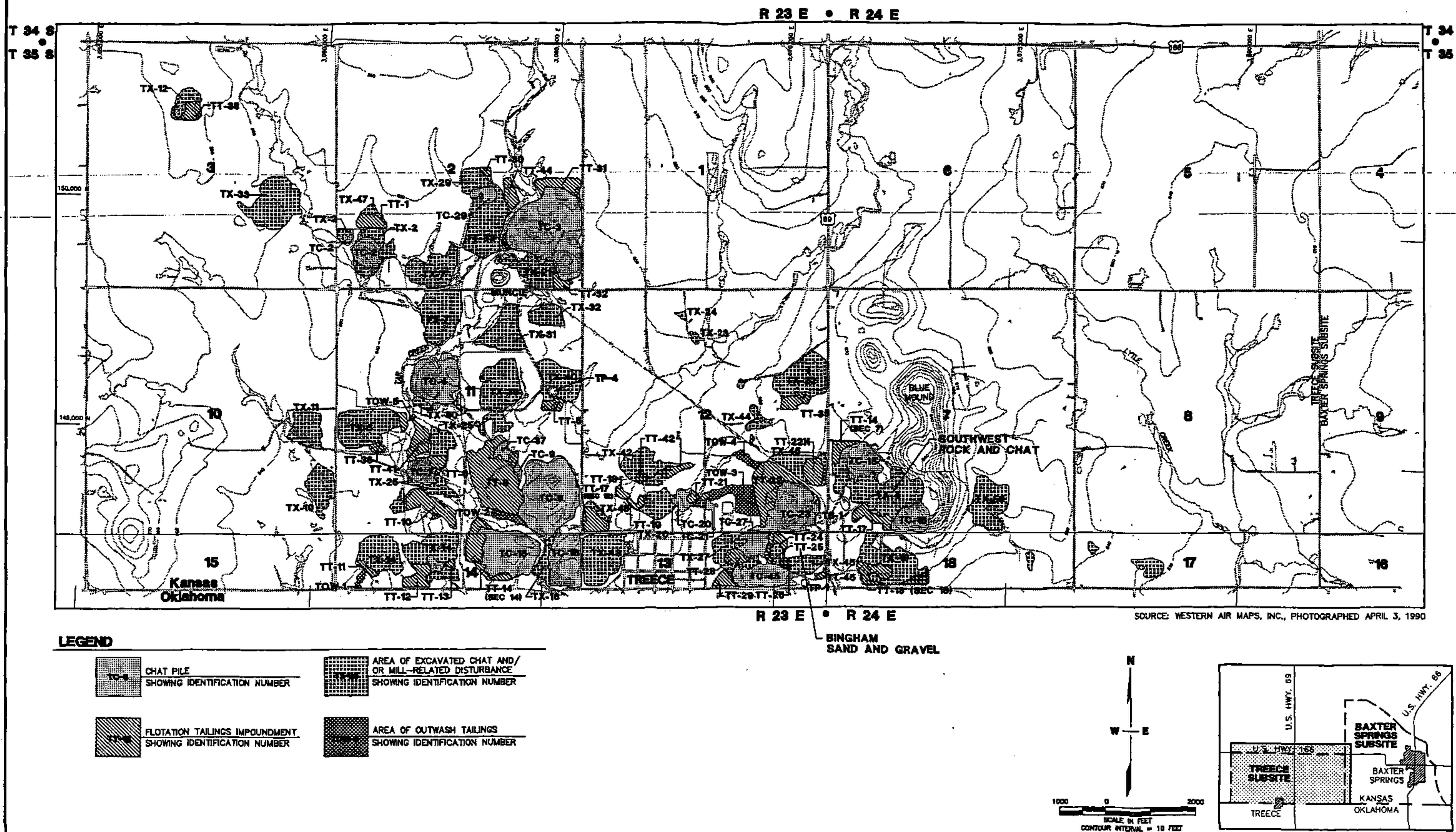


Dames & Moore

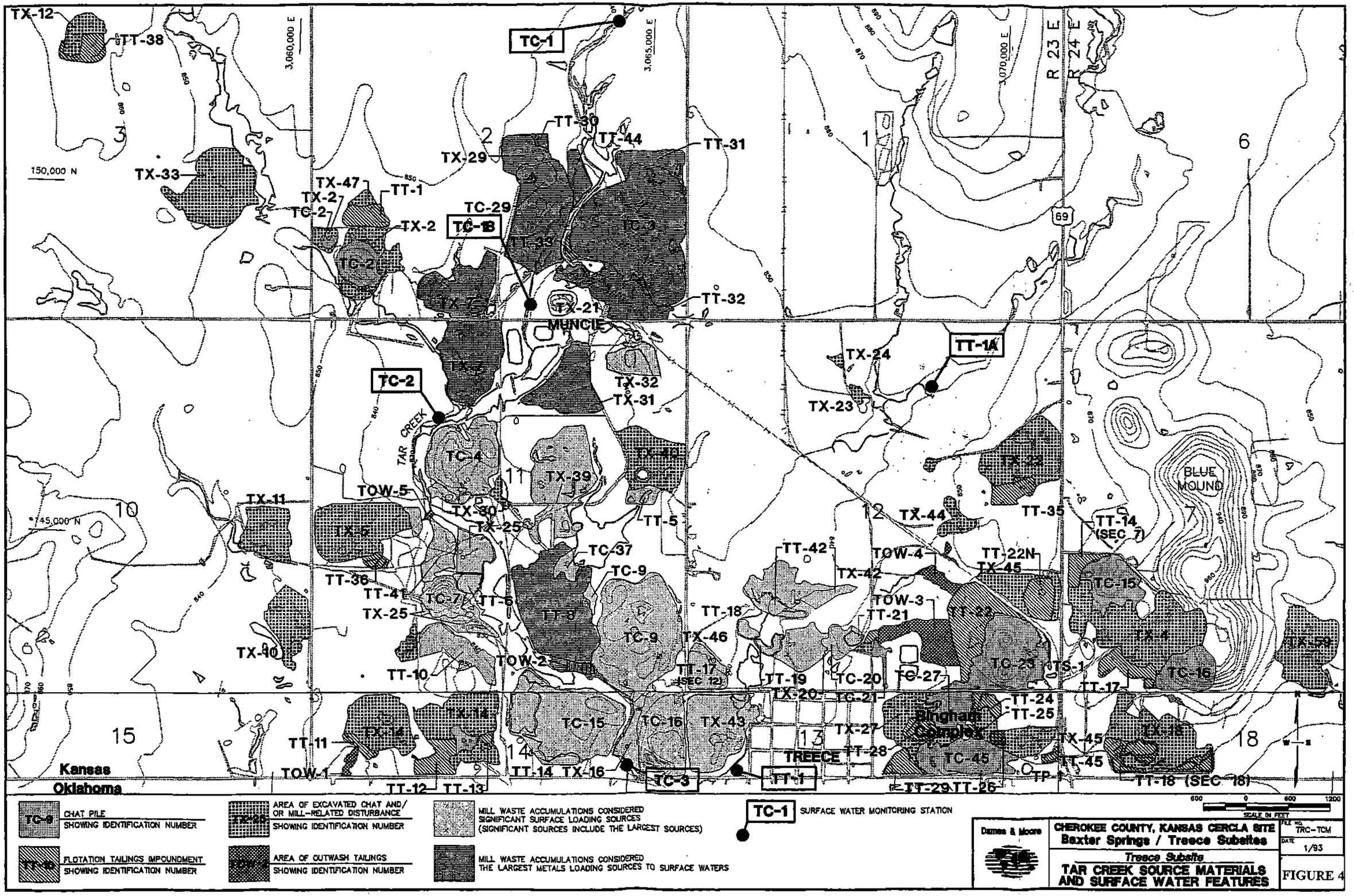
CHEROKEE COUNTY, KANSAS CERCLA SITE
Baxter Springs / Treece Subsites
Baxter Springs Subsite
AREAL EXTENT OF MILL WASTES

FILE NO. BAX-24
DATE 7/92

FIGURE 2



Dames & Moore	CHEROKEE COUNTY, KANSAS CERCLA SITE Baxter Springs / Treece Subsites *Treece Subsite* AREAL EXTENT OF MILL WASTES	FILE NO. TRC-24 DATE 7/92 FIGURE 3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R 24 E
TC-1
TT-39
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TX-29
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TX-33
TX-47
TT-1
TX-2
TC-2
TC-29
TC-1B
TT-33
TC-3
TX-21
MUNCIE
TT-32
TX-24
TT-1A
TC-2
TX-32
TX-31
TX-23
TAR CREEK
TC-4
TC-40
TX-39
TX-22
BLUE MOUND
TOW-5
TX-11
TX-30
TX-25
TT-5
TX-44
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TT-19
TC-20
TC-27
TC-23
TS-1
TC-16
TX-20
TC-21
TT-24
TT-25
TT-17
TX-14
TC-15
TC-16
TX-43
TX-27
Bingham Complex
TX-45
TT-11
TREECE
TT-28
TC-45
TT-45
TOW-1
TT-14
TX-16
TC-3
TT-1
TT-29
TT-26
TP-1
TT-18 (SEC 18)
Kansas
Oklahoma
69
600 0 600 1200
SCALE IN FEET
TC-9 CHAT PILE SHOWING IDENTIFICATION NUMBER
TT-40 FLOTATION TAILINGS IMPOUNDMENT SHOWING IDENTIFICATION NUMBER
TX-25 AREA OF EXCAVATED CHAT AND/OR MILL-RELATED DISTURBANCE SHOWING IDENTIFICATION NUMBER
TOW-5 AREA OF OUTWASH TAILINGS SHOWING IDENTIFICATION NUMBER
MILL WASTE ACCUMULATIONS CONSIDERED SIGNIFICANT SURFACE LOADING SOURCES (SIGNIFICANT SOURCES INCLUDE THE LARGEST SOURCES)
MILL WASTE ACCUMULATIONS CONSIDERED THE LARGEST METALS LOADING SOURCES TO SURFACE WATERS
TC-1 SURFACE WATER MONITORING STATION
Dames & Moore
CHEROKEE COUNTY, KANSAS CERCLA SITE
Baxter Springs / Treece Subsites
Treece Subsite
TAR CREEK SOURCE MATERIALS AND SURFACE WATER FEATURES
FILE NO. TRC-TCM
DATE 1/93
FIGURE 4

T 34 S
T 35 S
166
155,000 N
150,000 N
19TH STREET
ENGLISH "O"
EXISTING DIKE
BAXTER SPRINGS
SB-1
SB-2
BOW-1
BOW-2
BT-1 (SEC 3)
BT-2 (SEC 2)
BT-4 (SEC 10)
BT-6
OUTWASH TAILINGS TO BE EXCAVATED OR REMOVED
CHAT/SOIL COVER SYSTEM OVER FLOTATION TAILINGS
CHAT/SOIL COVER SYSTEM OVER FLOTATION TAILINGS AT BT-9, BT-8, BT-6, & BT-4
BX-40
BX-39
BX-38
BX-37
BX-32
BX-27
BX-29
BX-26
BX-16
BX-17
BX-2
BX-11
BX-22
BX-23
BX-28
BT-29
BT-30
BT-25
BT-9
BT-8
BT-40
BT-22
BT-28
BT-10
BT-3
BC-12
BC-2
N
W
E
0 800 1600 3200
SCALE IN FEET

BC-4 CHAT PILE SHOWING IDENTIFICATION NUMBER

BT-4 FLOTATION TAILINGS IMPOUNDMENT SHOWING IDENTIFICATION NUMBER

AREA OF EXCAVATED CHAT AND/OR MILL-RELATED DISTURBANCE SHOWING IDENTIFICATION NUMBER

AREA OF OUTWASH TAILINGS SHOWING IDENTIFICATION NUMBER

TYPICAL DIKE OR BERM

TYPICAL SURFACE WATER DIVERSION DITCH. ARROW INDICATES DIRECTION OF FLOW FOLLOWING REMEDIATION.

TYPICAL STREAM DIVERSION CHANNEL. ARROW INDICATES DIRECTION OF FLOW FOLLOWING REMEDIATION.

TYPICAL DETENTION/SEDIMENTATION BASIN

Waste addressed by 1997 ROD

CHEROKEE COUNTY, KANSAS CERCLA SITE
Baxter Springs / Treece Subsites
Baxter Springs Subsite
PREVIOUS PARTIAL SOURCE REDUCTION AT THE BAXTER SPRINGS SUBSITE

FIGURE 5

TABLES

TABLE 1
Baxter Springs and Treece Subsites' Mine/Mill Waste Totals
Cherokee County Superfund Site
Cherokee County, Kansas

Mine Waste Type	Baxter Springs Subsite		Treece Subsite	
	Area (acres)	Volume (cubic yards)	Area (acres)	Volume (cubic yards)
Chat	36.45	246,542	66.7 [4]	996,173 [4]
Tailings	75.69	151,518	131.71	514,175
Excavated Chat and Mill Sites	232.05	1,123,122 [1]	577.72 [4]	3,728,220 [2]
Subsidence Pits	14.31	1,696,259	5.29	346,441
Outwash Areas	21.45	69,212 [3]	15.17	48,400 [3]

Notes:
These numbers come from two tables in the Feasibility Study entitled 'Table A-1: Baxter Springs Mine/Mill Waste Piles' and 'Table A-2: Treece Mine/Mill Waste Piles.'
The Baxter Springs numbers have been adjusted for the partial source reduction that was conducted under the ROD

[1] - The volume is unknown. Therefore, based on several depth samples from the Remedial Investigation (RI), it was estimated using the known acreage and an estimated thickness of three feet.

[2] - The volume is unknown. Therefore, based on several depth samples from the RI, it was estimated using the known acreage and an estimated thickness of four feet.

[3] - The volume is unknown. Therefore, based on several depth samples from the previous Remedial Action (RA), it was estimated using the known acreage and an estimated thickness of two feet.

[4] - A recent (July 2006) update of the chat volume in Treece indicates that approximately 1.3 million cubic yards have been commercially used. This estimate assumes that by the time of the RA, only chat bases will remain of the currently commercially sold chat piles and thus they are included in the excavated chat and mill sites estimate.

TABLE 2

REMEDIAL ACTION OBJECTIVES (RAOs)

Source Materials RAOs

1. Prevent human ingestion of contaminants of concern (COCs) (cadmium, lead and zinc) from source materials that would potentially result in cancer risks greater than 1.0EE-06, non-carcinogenic hazard indexes greater than l, or blood. lead levels causing unacceptable human health risks (10 micrograms per deciliter of blood for children). Source materials containing less than 800 parts per million (ppm) lead and less than 75 ppm cadmium are deemed acceptable for preventing these potential human health risks.

2. Prevent the ingestion exposure of biota to COCs (cadmium, lead and zinc) in source materials that would potentially result in excessive ecologica1 risks. Source materials containing less than 10 ppm cadmium, 400 ppm lead, and 1,076 ppm zinc are deemed acceptable for these potential ecological risks.

Soil RAOs

1. Prevent human ingestion of COCs (cadmium, lead and zinc) from soils that would potentially result in cancer risks greater 1.0EE-06; non-carcinogenic hazard indexes greater than 1, or blood lead levels causing unacceptable human health risks (10 micrograms per deciliter of blood for children). Soils containing less than 800 parts per million (ppm) lead and less then 75 ppm cadmium are deemed acceptable for preventing these potential human health risks.

2. Prevent the ingestion exposure of biota to COCs (cadmium, lead and zinc) in soils that would potentially result in excessive ecological risks. Soils containing less than 10 ppm cadmium, 400 ppm lead, and 1,076 ppm zinc are deemed acceptable for these potential ecological risks.

Surface Water RAOs

1. Prevent ingestion and dermal exposure of biota to surface waters exceeding Kansas Aquatic Chronic Life Criteria, resulting from the release and transport of COCs (cadmium, lead, and zinc) from source materials (mine wastes) and non-residential soils within the subsites. The Kansas Chronic Aquatic Life Criteria for each of the three metals is calculated from an equation included in the Tar Creek Total Maximum Daily Load (TMDL) and is hardness dependent.

2. Prevent ingestion and dermal exposure to aquatic biota of COCs (cadmium, lead and zinc) by controlling the erosion and transport of mine wastes to surface water.

TABLE 3

COMPARISON OF ACTIONS UNDER THE 1997 RECORD OF DECISION (ROD) AND 2006 ROD AMENDMENT

1997 ROD	2006 ROD Amendment
1. Remediate a portion of the surficial mine wastes at Baxter Springs: chat piles and excavated chat areas BC-12, BX-11, BX-29, and BX-31; fine grained tailings BT-1 (SEC 3), BT-2 (SEC 2), BT-4, BT-6, BT-7, BT-8, and BT-9; and outwash tailings BOW-1 and BOW-2 (wastes shown on Figure 4)	1. Remediate remaining wastes at the Baxter Springs subsite: chat piles or excavated chat areas BC-1, BC-2, BC-4, BC-19, BC-20, BC-22, BC-23, BX-1 through BX-10, BX-12, BX-13, BX-15 through BX-20, BX-23, BX-24, BX-26 through BX-29, BX-30, and BX-32 through BX-41; fine grained tailings BT-1, BT-2, BT-3, BT-4, BT-10, BT-11, BT-13, BT-19 through BT-25, and BT-27 through BT-30; outwash tailings BOW-3 and BOW-4; and 'English 0', a mixture of chat, tailings, and excavated chat
2. Did not address surficial mine wastes/sediments at Treece subsite	2. Remediate all surficial mine wastes at the Treece subsite: TC-2 through TC-4, TC-7, TC-9, TC-15, TC-16, TC-20, TC-21, TC-23, TC-27, TC-29, TC-37, TC-45, TX-2, TX-4, TX-5, TX-7, TX-10 through TX-12, TX-14, TX-16, TX-18, TX-20 through TX-25, TX-27, TX-29 through TX-33, TX-39, TX-40, TX-42 through TX-46, and TX-59; tailings TT-1, TT-5, TT-6, TT-8, TT-10 through TT-14, TT-14, TT-17 through TT-19, TT-21, TT-22, TT-22N, TT-24 through TT-26, TT-28 through TT-33, TT-35, TT-36, TT-38, TT-41, TT-42, TT-44, and TT-45; and outwash tailings TOW-1 through TOW-5.
3. Remediate all impacted residential properties at the Baxter Springs and Treece subsites	3. No new action, one follow-up property identified and remediated
4. Implement institutional controls	4. Continue to seek institutional control adoption and add State of Kansas controls to augment existing approach

TABLE 4

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

Safe Drinking Water Act (SDWA) - 42 United States Code (U.S.C.), National Primary Drinking Water Standards, Maximum Contaminant Levels (MCLs), 40 Code of Federal Regulations (CFR), Part 141.

Kansas Safe Drinking Water Act

Kansas Administrative Regulations (K.A.R.) 28-15-13 for Safe Drinking Water.

Clean Water Act (CWA), 33 U.S.C.

Kansas Clean Water Law, Water Quality Standards, KSA 65-170 et. seq., K.A.R 28-16-28 et. seq.

Resource Conservation and Recovery Act (RCRA)

Kansas Hazardous Waste Management Act, KSA 65-3430 et. seq., K.A.R 28-31-1 to 28-31.

The Endangered Species Act, 16 U.S.C., Section 1531, 50 CFR Part 200, 30 CRF Part 402.

Kansas Non-game and Endangered Species Conservation Act, KSA 32-501.

Fish and Wildlife Coordination Act, 16 USC Secs. 661-665, 40 CFR Sec. 6.302(g).

Fish and Wildlife Conservation Act, 16 USC Secs. 2901-2912.

National Historic Preservation Act (16 U.S.C.), and the regulation at 33 CFR Part 800.

National Archeological and Historic Preservation Act (16 U.S.C., and 36 CFR Part 65).

The National Pollutant Discharge Elimination System, Effluent Limitations, 40 CFR parts 122, 125, and 440.

The Surface Mining Control and Reclamation Act (30 U.S.C., 30 CFR Part 816, Sections 816.56, 816.97, 16.106, 816.111, 816.116, 816.133, and 816.150).

Clean Water Act (Section 404, 33 U.S.C., 40 CFR Part 230, and 231).

Rivers and Harbors Act (Section 10, 33 U.S.C.), and related regulations 33 CFR 320, and Section 404 of the CWA, 40 CFR, Part 125, subpart M.

CWA Water Act, Discharge of Storm Water, 40 CFR Sec. 122.21, 40 CFR Sec. 122.26.

TO BE CONSIDERED CRITERIA

Federal Safe Drinking Water Act, National Primary and Secondary Standards, 40 CFR Parts 141 and 143 (Secondary MCLs and MCGLs).

EPA Guidance Document, Cleanup Level for Lead in Groundwater (1/15/93).

Draft Soil Screening Guidance, OSWER Directive 9355.4-14FS, December, 1994, EPA/540/R-94/101 and 106.

Risk Management Derived Residential Yard soils Remedial Action Levels for Lead and Cadmium, EPA Region 7 Record of Decision for the Baxter Springs and Treece Subsites (OU-3 and OU-4) of the Cherokee County Superfund Site, August, 1997.

Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, OSWER Directive No. 93555.4-12, July 14, 1994.

Kansas Clean Water Law, TMDL Regulations.

Site Specific Toxicity Reference Values for Aquatic Biota, EPA, Region 7 Record of Decision for OU-3 and OU-4 of the Cherokee County Site, August, 1997.

Executive Order on Floodplain Management, Executive Order No. 11988, 40 CFR Sec. 6.302(b) and Appendix A.

Executive Order on Protection of Wetlands, Executive Order No. 11990, 40 CFR Sec. 6.302(a) and Appendix A.

* This table is inclusive of guidance and to be considered (TBC) criteria. The Feasibility Study document within the Administrative Record File contains more information.

APPENDIX A

RESPONSIVENESS SUMMARY FOR THE RECORD OF DECISION
Baxter Springs and Treece Subsites (OU-3 and OU-4)
Cherokee County Superfund Site
Cherokee County, Kansas

Herein follows the responsiveness summary for the Record of Decision (ROD) Amendment for the Baxter Springs and Treece subsites of the Cherokee County Superfund Site (Site) by the Environmental Protection Agency (EPA). The responsiveness summary consists of the following three components: an overview of the public process, responses to verbal questions received at the public meeting, and responses to written correspondence received during the public comment period. This document is provided to accompany the ROD Amendment and reflects input resulting from the Proposed Plan and public comment processes.

Overview

The Proposed Plan and supporting documents included in the Administrative Record (AR) were made available for public review and comment for 30 days from July 24 to August 22, 2006. The potentially responsible party group includes the following companies: Gold Fields American Corporation, Blue Tee Corporation, Asarco, Inc,, and St. Joe Minerals Corporation (corporate successor is currently The Doe Run Co.). A public meeting was held in Baxter Springs, Kansas, on August 10, 2006, with over 60 people in attendance, The transcript from the public meeting has been added to the AR.

Three letters were received during the 30-day public comment period from the following people: two from a citizen of Baxter Springs and one from a local landowner. In general, the two letters from the Baxter Springs' citizen questioned various aspects of the Proposed Plan, supported a residential buyout in Treece, and concluded that the cleanup plan was illogical. The local landowner letter contained eight comments relating to chat use, future land use of remediated areas, filling mine shafts, and scheduling of construction. The letters received during the public comment period have been added to the AR.

Responses to Verbal Comments

Several questions were asked at the public meeting following the formal presentation component of the meeting. Since each individual may have asked multiple questions, the questions and associated responses are grouped for the individual posing the question. This summary provides generalized designations or affiliations for individuals asking questions. The detailed transcript of the public meeting has been added to the AR for the Site.

Questions from a Resident of Treece – A resident heading the buyout initiative in thee Treece area indicated that she would prefer that local buyouts of the residents happen first and then the EPA came in afterward to clean up the mine waste. She suggested that the EPA's selected remedy may be different if the residents were relocated prior to the cleanup as opposed to during or after the cleanup. Additionally, the resident questioned what was different about this cleanup and previous cleanups as well as the current timing of the cleanup. In particular, the resident questioned how much of the previous mine waste cleanup in Galena was in areas with no nearby residences.

Responses to the Resident of Treece – The remedy proposed by Region 7 addresses mine waste chat piles. Residential yards have already been cleaned up in previous actions. The EPA Superfund program cannot initiate residential buyouts in the Treece area or influence its potential timing based on a physical hazard such as subsidence into mine workings. The EPA's Superfund mission is to respond to impacts to human health and the environment due to hazardous substances, pollutants, or contaminants, which does not include physical hazards or social or economic issues. The residential buyout efforts in the Pitcher, Oklahoma, area were administered by the state and Region 6, but the Superfund program did not provide funding for the buyouts. Additionally, the previous mine waste cleanups in the Galena and Baxter Springs areas, as well as other lead sites in Region 7, did not require any residential relocation even though some of the mine waste was near residences and businesses. Furthermore, the mine waste presents a risk to ecological receptors and the natural environment such as animals, surface water bodies, etc,, as well as future residents who may construct homes on the mine waste, not current residents. Therefore, based on this risk, the mine waste cleanup is needed whether or not residents are living in the mine waste areas and the selected remedy would not change even if current residents were relocated.

Regarding the timing of the mine waste cleanup actions for Baxter Springs and Treece, the remedy is being proposed now for several reasons. First, EPA (Region. 6) and the state of Oklahoma are in the final stages of finishing a Remedial Investigation/Feasibility Study (RI/FS) and risk assessments for the mine waste operable unit of the Tar Creek Superfund Site in Oklahoma. That site is adjacent and downstream of the Treece subsite. The RI/FS and risk assessments determine how widespread the contamination is at a site, what the risk is from the contamination to humans and the environment, and what options there are for addressing the contamination. Following the remedy selection process outlined in the National Contingency Plan (NCP), it is expected that in the future, Region 6 will issue a Proposed Plan to address the Tar Creek Superfund Site mine waste and request public comment. The mine waste in both states heavily contaminates the south-flowing Tar Creek which continues to fail surface water standards in both Kansas and Oklahoma. Since Tar Creek is first contaminated with heavy metals from mine waste in Cherokee County before flowing into Oklahoma, Region 7 and the state of Kansas need to clean up the Cherokee County mine waste affecting Tar Creek before Region 6 addresses the possible mine waste cleanup in Oklahoma. This would maximize the reduction in heavy metal contamination to Tar Creek and be cost effective. Second, additional studies, observations, risk calculations, and information have been collected and published which together indicate that mine waste contamination is a greater problem for the environment than historically was suspected. This recent information, as well as the ecological risk, are also driving the selection of a remedy in the ROD Amendment at this time. Finally, the construction of several new residences on existing mine waste with elevated levels of heavy metals has resulted in elevated blood lead levels in several children. and the need for additional residential yard cleanups. In order to effectively prevent more construction on mine waste in the future, the EPA has decided to address this environmental issue now. Since the reasons behind the remedy selection for the mine waste cleanup are not based on the residents in either town being at risk (with the exception of future possible residents), the remedy to address the mine waste would not change regardless of the presence or absence of residents.

Overall, this mine waste cleanup will be very similar to those historically conducted in the Galena and Baxter Springs areas, although this ROD Amendment leaves no mine waste at the surface in the Baxter Springs area as opposed to the 1997 ROD. Additionally, the clay/soil

cap in this ROD Amendment will be thicker than that used in the Galena area, This is due to lessons learned regarding the erosion of the cap in certain locations in Galena. Also, the disposing of mine waste into mine shafts and pits (subaqueous disposal) was not previously used in the Galena or Baxter Springs areas. This disposal method will also be used in some areas in Waco, Crestline, and Lawton. Finally, there is the opportunity for private chat owners to sell their chat before the EPA cleans up the mine waste on their property. This ultimately decreases the amount of mine waste the EPA will have to clean up while allowing the landowner to dispose of chat in an environmentally safe manner.

Questions from a member of the Kansas House of Representatives – An elected state representative asked what could the Ballard property, which has mine waste buried under a clay/soil cap and specially-developed vegetation, be used for. A more general question asked by the state representative was how land with capped mine waste could be reused. Additionally, the state representative asked what mine discharge was, specifically regarding some monitoring data on mine discharge versus chat leachate on a graph shown during the presentation.

Responses to the State Representative – Region 7 has not specifically looked at reuse possibilities for the Ballard property or property that will have mine waste buried on it in the future. This issue is something Region 7 would like to discuss and determine at a future date with local officials and othcr public input. However, although some amount of light reuse may be possible, it is critical that the clay/soil cap and vegetation be maintained to reduce the exposure of humans and the environment (animals, plants, streams, sediment, etc.) to the heavy metals in mine waste. Activities such as building construction (residential or nonresidential) and farming would not be possible since the clay/soil cap would be greatly disturbed or possibly destroyed. Large accumulations of mine waste will be greatly consolidated before capping and many pits and collapse features filled with wastes, The filled pits, shafts, and collapses, as well as capped areas of mine waste, would not be desirable for farming. However, these actions will reduce the footprint of the mine waste and retun a sizeable amount of land back for any use. In summary, more land will be available for any use as a result of the mine waste cleanup.

Mine discharge, as shown on the United States Geological Survey (USGS) graph during the public meeting presentation, is water that is discharging from unplugged mine shafts, vent holes, seeps, and abandoned mine dewatering wells. This water generally has elevated levels of heavy metals. The USGS study which was referenced during the public meeting determined how much of the metals in Tar Creek in Oklahoma might come from water seeping through the chat (chat leachate) into the stream versus how much might come from mine discharge. Overall, the study found that cadmium and lead loading was greater from chat leachate than mine discharge, while zinc loading was comparable between the two sources.

Question from a Treece Landowner – The landowner wanted to know details of the future buyout such as possible stockpiling of mine waste on his land in Treece and whether or not only his residence or his entire land would be part of the buyout. Additionally, the landowner wanted to know if there had been any physical verification, such as test wells, of the mine maps.

Response to the Treece Landowner – As indicated by the response to the first question by the Treece resident, Region 7 cannot conduct residential buyouts based on physical hazards or social or economic issues. Therefore, Region 7 cannot comment on who will be bought out or what land the buyouts might address. Regarding verification of the mine maps, Region 7 has not

conducted any testing to determine the accuracy of the mine maps, nor is Region 7 aware of any testing being conducted to determine their accuracy, It should be noted, however, that the Army Corp of Engineers' report published in January 2006 on the risk of subsidence in Picher, Oklahoma, and nearby areas did not include any determination of how accurate the mine maps were by drilling or any other method, No subsurface explorations were conducted for that report and the mine maps were used at face value with the assumption that the maps may not be entirely accurate.

Question from a Treece Landowner – A land owner asked if and how Region 7 would take into account surrounding growing crops when filling and/or stabilizing mine shafts located in a field. The 1andowner also asked what cleanup actions are being taken by Region 7 in adjacent Missouri counties affected by mine waste.

Responses to the Treece Landowner – Region 7 and its state counterpart will definitely work around a farmer's crops when a mine shaft needs to be stabilized and/or filled and when capping and/or consolidation of mine waste as part of this remedy. At this time, the exact details of how Region 7 and the state will address this issue are not available and may be different for different properties based on their characteristics. Some general possibilities could include plugging mine shafts prior to the planting of crops or after their harvest, or defining a narrow track for construction equipment and personnel to use when coming to and leaving the mine shaft to minimize disturbing crops. In the past, Region 7 has encountered and met this particular challenge.

Regarding mine waste cleanups in Missouri, Region 7 has issued a ROD for addressing the mine waste in Jasper County. The ROD for Jasper County selected essentially the same remedy as the one in this ROD Amendment. As a result of the Jasper County ROD being issued earlier (2004) than this ROD Amendment, the technical basis for the two selected remedies are not exactly the same but the overall remedies are very similar.

Question from a Baxter Springs Resident – A resident asked what the difference was between the mine-related wastes discharging to the river and the releases to the river by companies such as Alcoa and ConAgra.

Response to the Baxter Springs Resident – In general, companies discharging to surface water bodies have permits specifying the chemicals or wastes and the amount they can discharge. These permits are issued by either the state or the EPA and inspectors are routinely sent out by the regulating agency to ensure that the terms of the permit are being followed and human health and the environment are protected. In instances of illegal dumping to surface water bodies, the EPA highly encourages contacting the agency so that it can send an inspector to the site of the dumping and investigate whether or not the company is following the correct procedures.

Question by a Baxter Springs Resident – The resident wondered if the "gravel," probably chat, and two sinkholes south of the remediated Ballard pile would be addressed under the ROD Amendment.

Response to the Baxter Springs Resident – Regarding the chat, Region 7 will deal with remaining chat and other mine waste around the Ballard pile and throughout the Baxter Springs and Treece areas. The ROD Amendment is intended to address all the mine waste remaining at

the surface in the Baxter Springs and Treece areas. Regarding the sinkholes, the state of Kansas has a program to address sinkholes and mine shaft issues on a limited basis. If you are aware of any sinkholes, mine shafts, or mine collapses, please report them to the Surface Mining Section of the Kansas Department of Health and the Environment (KDHE) located in Frontenac, Kansas or call (620) 231-8540. This office maintains a list of sinkholes and mine shafts for stabilization and filling.

Question by a County Landowner – The landowner asked about the time frame that problems or issues not included in the ROD Amendment would be dealt with, specifically with regard to the five-year time frame associated with Five-Year Reviews that would occur after the completion of the remedial action.

Response to the County Landowner – Five-Year Reviews will be required at these subsites since the capped mine waste will not allow for unlimited use and unrestricted exposure at these locations as well as the contaminated shallow groundwater in these parts of Cherokee County. Five years is the maximum amount of time allowable between these reviews. However, if something related to the mine waste cleanup was missed in the ROD Amendment, Region 7 can address it sooner than five years if required.

Question by a Baxter Springs Resident – The resident questioned how the cleanup would address mine waste immediately adjacent to Treece but on the Oklahoma side of the state line. Additionally, the resident asked about some contamination noted on her monthly water bill by the city.

Response to the Baxter Springs Resident – Although the state of Oklahoma is not within the jurisdiction of Region 7, the two EPA regional offices have been in contact regarding this issue. In the future, Region 6 is expected to issue a Proposed Plan for a ROD for the mine waste at the Tar Creek Superfund Site for public comment. While the Region 6 Tar Creek remedy may not be exactly the same as the Cherokee County remedy, the two remedies should be similar for similar conditions.

Regarding the contamination in the monthly water bill, the EPA and state investigated this comment. It was determined that there is a notice that goes out to the Baxter Springs residents to let them know the water is in violation of the Maximum Contaminant Level (MCL) for trihalomethanes (THMs). The THMs are the result of chlorinating the water. The water tests have shown concentrations of THMs as high as 120 micrograms per liter (µg/L) and the standard is 80 µg/L. The Bureau of Water at the state has sent the city of Baxter Springs an order to upgrade their system, The city is trying to comply and has already completed one project to help the situation.

Question by a Treece Resident – The resident questioned if the dust coming off the chat on the local unpaved county roads was going to be addressed. She also indicated that the potential silicosis effects from using limestone on the unpaved county roads and driveways seemed to negate any health benefits derived from using a gravel material other than chat.

Response to the Treece Resident – Region 7 worked with the county commissioners historically and, as a result, there is a ban on using chat as gravel on the unpaved county roads, For several years, the county has used limestone gravel on the county roads. Although the chat

previously laid down on the county roads was still there, observations by Region 7 showed that the chat was being buried underneath the limestone gravel, thus minimizing the amount of dust from pulverized chat when driving on the county roads. Since the county has addressed Region 7's concerns about using chat on the county roads, Region 7 cannot force the county to pave all the unpaved county roads. Additionally, air studies were conducted during the remedial actions in Galena and Baxter Springs. Air monitors accompanied construction workers as they were involved in the mine waste cleanups at the two subsites. This was considered a worst-case scenario by Region 7 with regard to inhalation of contaminated dust since construction equipment was actively moving mine waste and potentially creating contaminated dust. The air studies did not indicate a risk by metal-laden dust to human health at either subsite. Therefore, the EPA does not expect there to be a risk to people from the metals when breathing dust from unpaved county roads. Potential silicosis from crushed limestone is not a release or threat of release of a hazardous substance and therefore the EPA has limited ability to address the problem using Superfund authority. It should also be noted that crushed limestone does not present the same environmental hazard that chat presents to human health or the environment.

Question by a Treece Resident – The resident questioned why the EPA restricted the use of chat on unpaved roads but allowed chat to remain in piles around the towns, in particular, around his residence where vehicles kicked up dust, Additionally, he asked when the EPA would start the remedial action discussed in the ROD Amendment.

Response to the Treece Resident – With this ROD Amendment, Region 7 intends to address all the remaining surficial mine waste in the Baxter Springs and Treece areas. Therefore, by removing, consolidating, subaqueously disposing, and/or burying the remaining mine waste, Region 7 will address the issue of dust potentially coming off of chat piles. However, as indicated earlier in response to several questions, the selected remedy is not driven by risk to current residents which was addressed by the residential yard cleanup. Additionally, as indicated in the previous response, Region 7 has determined that dust from mine waste has not resulted in the recontamination of any previously remediated residential properties, In response to the resident's second question, Region 7 expects to begin implementing the remedy late next year or early the following year.

Responses to Written Correspondence

Two letters from a Baxter Springs citizen – The first letter contains comments on unpaved chat parking lots and county roads, alkaline groundwater flowing into the Spring River, and the plan to cap chat piles. The comments are paraphrased below and EPA's responses are identified.

The first comment questions why a plan similar to Ottawa County, Oklahoma, where approximately 2 million dollars was spent for asphalting county roads could not be implemented to deal with the chat roads in Cherokee County and use chat in the asphalt.

Response: Region 7 does not agree that the chat roads need to be remediated. As indicated earlier in a response to a Treece resident, this is based on the county's historical ban on using chat as gravel on unpaved county roads and air studies conducted during previous mine waste remedial actions. Therefore, Region 7 cannot expend funds on paving roads with chat-containing asphalt when it does not consider the unpaved roads a human health or environmental

hazard from the chat. However, Region 7 does support other entities in the environmentally proper use of chat such as encapsulation in asphalt, as indicated in its February 2003 fact sheet on mine waste (attached). Regarding the road paving in Ottawa County specifically described in the letter, it was conducted for one of two historical reasons: (1) paving paid for by Region 7 for damage to county roads by trucks during a 2001 remedial action or (2) paving of approximately 20 miles of roads as part of the Oklahoma Plan for Tar Creek. The funding for the road paving done under the state's plan was secured by the United States Congress and the state. Ottawa County contracted out the paving locally.

The second comment indicates that alkaline water emerging from the ground and running into Spring River at a specific property should be addressed.

Response: The EPA is unaware of the situation referenced secondly in the letter, specifically, alkaline water flowing out of the ground into the Spring River at a Baxter Springs property. In order to potentially address this water, the EPA will contact the author to get more details.

The third comment indicates that if chat lots around Baxter Springs were asphalted, the city's storm drain system would not have the capacity to handle the additional water and requested assistance expanding this system.

Response: Chat lots are similar to chat roads inasmuch as there is a small volume of chat spread over a large area. As indicated in the first comment and a previous response to a Treece resident, the EPA does not consider chat lots a human health risk, especially when compared to the future potential resident and ecological risk associated with large chat piles and tailings impoundments. Therefore, the EPA has no plans to pave chat parking lots at the subsites. While runoff from chat lots may contribute to the metals contamination in the Spring River due to storm drainage, it is most likely minimal when compared to the metals-laden runoff and drainage from large chat piles and tailings impoundments affecting the river and its tributaries, The various potential contributions will be more thoroughly investigated and quantified when the EPA studies the Spring River Basin which began in late spring of 2006 and will take several years to complete.

The fourth and final comment indicates that this Baxter Springs citizen feels that covering chat piles is unacceptable. He suggested that the chat must be removed before remediation and mine shafts capped.

Response: The EPA believes the most responsible way to address the mine waste is the selected remedy in the ROD Amendment, namely, the removal, consolidation, subaqueous disposal, and/or capping of the mine waste. Based on the ecological and future residential risk, the selected remedy is protective of human health and the environment, is cost effective, and utilizes engineering solutions. The selected remedy also allows for commercial chat sales, addresses all surficial mine waste, and allows flexibility with regard to capping in place, consolidation and capping, or subaqueous disposal. To date, there are no treatment methods for the heavy metal-contaminated mine waste. Initially, other possible options for addressing the mine waste were investigated but were all found to be prohibitively expensive. Additionally, the large mine waste volume prohibits complete removal of the mine waste since there is no landfill that would or could accept nearly seven million cubic yards of a hazardous substance, nor would

any local community be likely to accept the transfer of such wastes into their community. Therefore, the EPA has determined that the selected remedy will best address the remaining surficial mine waste at the subsites. Regarding capping the mine shafts, as indicated earlier, the state has undertaken this and caps a select number of mine shafts based on the available funding. A hazard evaluation relative to the other known mine shafts or collapse features related to the historical mining is used to set priorities.

The second letter by the Baxter Springs citizen alleges that the Proposed Plan was not logical as well, as a waste of money, and that the plan mirrors previous plans for the Tar Creek Superfund Site in Oklahoma which be claims "did not fix the problem." He suggests several points to consider regarding the Proposed Plan and encourages the different regions to coordinate their work. The comments are paraphrased below and Region 7's responses are identified.

The first comment indicates that the Baxter Springs citizen feels the Proposed Plan is illogical.

Response: First, for reasons previously documented, Region 7 disagrees that the Proposed Plan is not logical. In addition to previous reasons, given the large mine waste volume (approximately 6.8 million cubic yards) and the cost (approximately $66 million), the cost to address one cubic yard is less than $10. In the case of the Baxter Springs and Treece areas, Region 7 has determined and documented that the risk to ecological receptors, due to exposure to heavy metals in mine waste, and future potential residents who might move onto existing mine waste, is unacceptable. Therefore, Region 7 must address these risks in the best possible way. Given the various criteria Region 7 must use to weigh and balance when selecting remedies according to the NCP, Region 7 has determined that the selected remedy best addresses the risk due to mine waste. This decision is also based on previous successfu1 mine waste cleanups at other parts of the Site, namely those done in the Galena area and the Baxter Springs area. The cap stability issues at the Galena subsite has been addressed in this ROD Amendment by using a thicker cap. In all other ways, the Galena and Baxter Springs remedial actions addressing the mine waste, specifically removing, consolidating, and/or capping, has proved successful in minimizing risk to ecological receptors and future residents.

The second comment claims that the Proposed Plan mirrors the plan used by Region 6 at the adjacent Tar Creek Superfund Site in Oklahoma

Response: Currently, Region 6 has not released a Proposed Plan for a preferred remedy for the mine waste at the Tar Creek Superfund Site. Therefore, the Region 7 selected remedy cannot mirror the Region 6 preferred remedy since one does not exist for the mine waste at the Tar Creek Superfund Site. Additionally, the approximately 150 million dollars spent to date at the Tar Creek Superfund Site has addressed problems other than the mine waste including: well plugging to eliminate groundwater pathways from the contaminated upper aquifer to the pristine lower aquifer, construction of several dikes and diversion channels to reduce acid mine drainage discharge to Tar Creek from abandoned mines; the cleanup of metals-contaminated residential properties posing risks to the residents, and the cleanup of abandoned mining chemicals at a mining office complex. Region 6 is in the final stages of the study phase for the mine waste cleanup at the Tar Creek Superfund Site and will be issuing a Proposed Plan describing the preferred alternative for the mine waste cleanup for public comment. Region 7 has been

coordinating closely with its counterparts in Region 6 on common aspects of respective mine waste actions.

The third comment suggests that the EPA relocate Treece residents either due to the presence of chat or subsidence risk.

Response: As indicated earlier in the response to a Treece resident, as the CERCLA law stands, the EPA's authority is limited and cannot perform or fund a residential buyout in Treece or anywhere for reasons solely related to physical hazard presented by mine collapse or economic hardship resulting from the buyout of nearby Picher, Oklahoma. Regarding the continued hazard presented to the local population from the chat and other mine waste, the EPA has already addressed the risk to the population by performing residential yard cleanups in the Baxter Springs and Treece areas. A total of 441 properties were sampled and 46 yards were remediated at the Baxter Springs subsite. At the Treece subsite, a total of 148 properties were tested and 41 yards were remediated. Residential yard cleanups were finished in 2000. As proof of the effectiveness of residential yard cleanups in eliminating the heavy metal risk to human health, a follow-up blood lead study was conducted by the KDHE, the local Cherokee County Health Department, and the Agency of Toxic Substances and Disease Registry (ATSDR) in the community of Galena where over 700 residential properties were remediated. The study found that the geometric mean of blood lead levels in Galena children under six years of age decreased from 4.13 µg/dl to 2.29 µg/dl following the residential cleanup (44.6% reduction). The overall United States geometric mean of blood lead levels in children under six years of age in 1999 to 2000 was 2.2 µg/dl. Therefore, Region 7 believes it has reduced the risk to the local population from mine waste to an acceptable level. As stated earlier, the risk responsible for driving the current ROD Amendment is ecological risk (i.e., animals, plants, streams, etc.) and future residential risk, not current human health risk.

The fourth comment suggests that the EPA mandate chat use in regional federal and state projects using concrete or asphalt by providing incentives or transportation assistance. The Baxter Springs resident also thinks that capping the chat is unacceptable since the landowner cannot use the land with capped mine waste on it.

Response: While the EPA cannot mandate that other federal and state agencies use chat in asphalt in federal and state projects, it can and has encouraged other federal and state agencies to do so. Specifically, Region 7 and KDHE have engaged in conversations with the Kansas Department of Transportation about using chat in state road projects. Additionally, Representative Gatewood at the public meeting held in Baxter Springs in August stated that he would like to propose a bill in the state House of Representatives mandating a certain percentage of chat be used on highway projects throughout Kansas. Overall, Region 7 has pursued several options to encourage commercial chat sales. It should be noted, however, that not all the mine waste is commercially viable or usable in concrete or asphalt. As for leaving the landowner with no land they can use after the remedial action, Region 7 also finds this to be untrue. While the large volume of mine waste present at the two subsites means some mine waste will be consolidated and left in place with minimal land reuse options, a substantial amount of the land will be returned to unlimited use and unrestricted exposure, allowing the landowner to use the land in any manner he sees fit.

The fifth comment recommends that EPA Regions 6 and 7 and other government officials work together to address the common problems in the area..

Response: The EPA agrees that Regions 6 and 7 as well as the states, should work more closely together. Region 7 believes that the two Regions' approaches to cleaning up the Tri-State Mining District sites have been consistent. As an example, both Regions have prioritized and nearly completed all residential yard cleanups in the Tri-State Mining District and are now focusing on surficial nonresidential mine waste. Both Regions encourage appropriate chat usage and have developed and distributed similar mine waste fact sheets. Both Regions and all three of the affected states (Kansas, Oklahoma, and Missouri) are working jointly on a uniform watershed characterization approach for the Spring River Basin in addition to the joint efforts of state and federal trustees on natural resource damage issues. Since Region 6 has not finalized or released a plan for addressing the mine waste, as mentioned earlier, Region 7 is unaware of any material differences in addressing the Tri-State Mining District mine waste between Regions 6 and 7.

The sixth and final comment indicates that the Baxter Springs citizen feels EPA Region 6 and Region 7 have in common only "is both regions spend large sums of money and the problem still exists."

Response: Region 7 disagrees with the statement that "the problem still exists" at the Site. Considering the large areal extent of the site (115 square miles) and large volume of mine waste and contaminated soil, Region 7 has made much progress in cleaning up and ultimately closing the Site. In the rural areas of Galena, Region 7's cleanup consisted of providing a permanent water supply in 1994 to over 400 residences by the installation of deep aquifer drinking water supply wells and the formation of a rural water district, Additionally in Galena, a later Region 7 cleanup completed in 1995 included the remediation of 900 acres of mine waste and the abandonment of deep wells acting as a potential conduit for contaminants to migrate from the upper impacted aquifer to the lower pristine aquifer. Subsequently, an ecological study indicated improvements to water quality parameters in Short Creek following the mine waste cleanup in that area Also in Galena, nearly 1,500 residential properties were characterized and over 700 properties had residential yard remediation. At the Badger, Waco, Lawton, and Crestline subsite, a ROD was issued in 2004 which addressed the mine waste there in a similar manner as that outlined in this ROD Amendment. It is anticipated that the remedial action in these areas will start late next year. Previously at the Baxter Springs and Treece subsites, the residential yard cleanups were completed in 2000. Finally, approximately 700,000 cubic yards of mine waste was remediated in Baxter Springs in 2004. Therefore, Region 7 has made significant advances in addressing the problems related to mining contamination at the Site.

A local landowner's letter contained eight comments relating to chat use, future land use of remediated areas, filling mine shafts and scheduling of construction. The comments are paraphrased below and EPA's responses are identified.

The first comment requests that the ROD Amendment formally recommend acceptable uses of chat as described in Region 7's February 2003 Fact Sheet on mine waste.

Response: The ROD Amendment description of the selected remedy encourages responsible chat sales and states that Region 7 will meet with potential sellers. The ROD Amendment also states that the Fact Sheet will be provided to chat sellers and is attached

The second comment requests that the Agency specify acceptable uses for reclaimed

land, specifically referring to the Ballard Mine area of the Baxter Springs subsite which was remedia.ted approximately two years ago.

Response: The remediation work at areas such as the Ballard mine consists of grading the chat piles, then capping with 18 inches of soil and revegetating the cap. The primary beneficial use for such remediated areas is serving as an engineered structure that contains the remaining chat underneath the cap and prevents the chat from contributing to stream and sediment contamination. While there is some barrier to terrestrial animals that may be on the surface, that is incidental to the primary design purpose. It should be noted that the remediation was not designed to reclaim use of the land where the chat was located, but to prevent the chat piles from adversely affecting other areas, namely, the stream and sediments.

While the areas after remediation have the appearance of natural Kansas grassland, unfortunately, the areas are far from natural and are quite limited for uses beyond containing the chat. Uses with human occupancy such as residential or commercial are discouraged since the integrity of the cap could be too easily compromised with even a small amount of digging or construction, The same applies to grazing or till cropping, as both have the potential for erosion. Hay cropping might be acceptable since wheeled cutting and baling machinery likely would not disturb the cap and the perennial crop would serve as a good erosion preventative. However, Region 7 does not have studies showing that contaminants do not uptake into the hay from below the soil cap, so Region 7 is unwilling to recommend hay cropping as an approved agricultural use at this time.

Unfortunately, Region 7 generally sees no other significant use for the remediated areas other than as engineered vegetated structures that will need to be maintaincd. Still, landowners may have different proposals than those discussed above and may come up with something acceptable. Prior to land use changes, landowncrs should contact both Region 7 and the KDHE which is charged with oversight of the long-term operation and maintenance of the remedy to discuss the continued integrity of the soil cap. However, it is important to note, as explained previously, that a significant portion of land will be usable after the removal of mine waste for consolidation.

The third comment encourages Region 7 to cooperate with other environmental agencies to cap mine shafts while Region 7’s contractors are on site.

Response: Burial of chat wastes in subsidence pits is one aspect of the remedy, but only inasmuch as there may be cost savings in construction. EPA's authority, appropriations, and ability to compel responsible parties to do work are limited to response actions to address releases of hazardous substances, pollutants, or contaminants. Mine shafts present a physical hazard at the site, but not a hazard that EPA has the legal authority to address. EPA coordinates closely with the Surface Mining Section of KDHE that uses limited state funds to address a number of mine shafts yearly. Ultimately, Kansas law defines the landowner responsibilities for such physical hazards. However, in areas where remediation has occurred, obscuring brush or woods are cleared with the result that the shafts may actually be better seen and avoided.

The fourth comment notes and agrees with EPA's acknowledgment that remediation costs are reduced if chat can be removed rather than burying it.

Response: EPA has not in past RODs for Cherokee County actively encouraged chat removal prior to remediation. Any chat sales and use should follow the Region 7 Fact Sheet on Mine Waste for acceptable uses (attached).

The fifth comment suggest that the ROD Amendment set forth a process to identify chat piles, prioritize EPA's work, and publish a schedule for the remediation of chat piles at the earliest opportunity to allow the maximum removal of chat piles prior to remediation.

Response: EPA generally agrees with the comment, but rather than in the ROD Amendment, EPA will specify in its remedial design that such activities are performed. This may be a complex process since some chat piles may be more commercially exploitable than others, some chat piles may contribute more than others to the environmental endangerment, some chat piles may logically phased before others in the overall construction, or a variety of factors. Landowners should not wait for such a design study or publication however, and are encouraged to proceed with chat removal and sales pursuant to the Region 7 Mine Waste Fact Sheet sooner rather than later,

EPA disagrees with the commenter that the goal should be to consolidate and use the chat rather than to consolidate and bury it, Chat sales and capping are not necessarily competing processes, Both will be ongoing during the remediation period. However, EPA fully anticipates that capping will have to be extensively applied to achieve the environmental goals in a reasonable time frame.

The sixth comment reiterates the fifth comment, adding that the publication of a work schedule should occur in advance of the design of the capping.

Response. EPA agrees, and reiterates the earlier response. The EPA remedial design in which a schedule is produced would be in advance of the construction design for individual chat piles and would include a schedule for when the construction design would occur.

The seventh comment requests that the ROD Amendment acknowledge that the chat is a valuable source of high quality aggregate for highway paving projects.

Response: EPA acknowledges that the chat can be acceptably used as aggregate in paving as provided in the Region 7 Mine Waste Fact Sheet. EPA is not qualified to remark on the physical quality of chat as aggregate.

The eighth comment suggests that expenditure of money on transportation projects is the best and most effective method to remediate chat and promote economic development.

Response: An increase in transportation projects that use chat would contribute to the remediation by decreasing the potential for contaminant loading on streams and sediments. Nonetheless, not all chat tailings are suitable for aggregate or commercially exploitable. As stated earlier, EPA fully anticipates that capping will have to be extensively applied to achieve the environmental goals in a reasonable time frame.

APPENDIX B

Detailed Cost Estimate for Modified Alternative 8A
Cherokee County, Kansas Superfund Site

	Item Description	Unit Cost	Baxter Springs Quantity	Treece Quantity	Baxter Springs Cost ($)	Treece Cost ($)	Total Cost ($)
1.0	SOURCE MATERIALS ACTIONS						
1.1	Excavate and place appoximately 20% of current mine waste either with existing wastes or in mine openings (per cubic yard)	$5.00	1,250,172				$6,250,860.00
1.2	Regrade and revegetate excavated areas (per acre)	$5,000.00	151				$754,600.00
1.3	Regrade, cap and revegetate remaining mine waste areas (per acre)	$35,000.00	1,023				$35,805,000.00
1.4	Excavate and place contaminated soil either with existing wastes or in mine openings (per cubic yard)	$5.00	495,446				$2,477,230.00
	Subtotal Source Materials Actions (1.0)						$45,287,690.00
2.0	SURFACE WATER ACTIONS						
2.1	Stream Channel and Erosion Controls (per linear foot)	$26.00	6,300	14,400	$163,800.00	$374,400.00	$538,200.00
2.2	Sedimentation Basins	$48,000.00	2	4	$96,000.00	$192,000.00	$288,000.00
	Subtotal Surface Water Actions (2.0)						$826,200.00
	SUBTOTAL DIRECT COSTS FOR SOURCE MATERIALS AND SURFACE WATER ACTIONS						$46,113,890.00
3.0	INDIRECT COSTS						
3.1	Engineering Design	6%					$2,766,833.40
3.2	Construction Management	10%					$4,611,389.00
3.3	Contingency	20%					$9,222,778.00
3.4	Operation and Maintenance	3%					$1,383,416.70
3.5	Mobilization and Demobilization	5%					$2,305,694.50
	Subtotal Indirect Costs for Source Materials and Surface Water Actions (3.0)						$20,290,111.60
	TOTAL ESTIMATED COST OF MODIFIED ALTERNATIVE 8A IN 2006						$66,404,001.60

Assumptions:

1. The unit costs are based on approximate actual costs for the recently completed remedy at the Baxter Springs subsite.
2. The Baxter Springs *Quantity and Treece Quantity are* based on the remedial work conducted under the 1997 Record of Decision, select chat piles at Treece sold for commercial purposes (see Note 3), and Tables A-1 and A-2 in Appendix A in the Feasibility Study. These tables are *entitled Baxter Springs* Mine/Mill Waste Piles and Treece Mine/Mill Waste Piles, respectively.
3. Select current chat piles at Treece are anticipated to be sold in the future during remediation, leaving behind only a footprint. These *future footprints may* be included in Items 1.1 and 1.2. Pile TC-3 is currently being sold and pile TC-23 is being used for construction projects. Piles TC-9, TC-15 (Section 14), TC-16 (Section 14), and TC-45 have been used historically for commercial purposes and *some deposits* have existing commercial potential.
4. The engineering design cost for the project was estimated to be 6% of the total direct cost.
5. The construction management cost for the project was estimated to be 10% of the total direct cost.
6. The contingency cost for the project was estimated to be 25% of the total direct cost.
7. The operation and maintenance cost for the project was estimated to be 3% of the total direct cost.
8. The mobilization and demobilization cost for the project was estimated to be 5% of the total direct cost.