MINIMIZING LOST RESOURCES AT TAR CREEK

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Tribal Lands and Environment Forum
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PRESENTATION OVERVIEW

- History
- Tar Creek Superfund Site
- Past, Present And Future Remedial Projects
- “We need more options!”
  - Minimize top soil loss
  - Protective of tribal uses
  - Meet objectives of the ROD
- Tar Creek compared to other Tribal Superfund sites
- Questions/Answers
Several hundred years ago, the Quapaw were a division of a larger group known as the Dhegiha Sioux. They split into the tribes known today as the Quapaw, Osage, Ponca, Kansa, and Omaha.

The Quapaw moved down the Mississippi River into Arkansas. This is how the Tribe became known by other Tribes as “Ugaxpa” (“Ugakhpa”), which means (roughly) “the downstream people.”

The Quapaws settled in the area where the Arkansas River met the Mississippi River.

This is where the Quapaw stayed until they were pushed out by the Arkansas Territorial, and US Governments in the 1820s.

After being removed from Arkansas, the Quapaws suffered greatly from disease and starvation until the US Government was finally convinced in 1833 to establish a reservation for them in Oklahoma.
TAR CREEK SUPERFUND SITE

- Tri-State Mining District
- Mining began in the area during the late 1800’s and lasted until approximately 1970
- Mining and milling of ore (primarily lead and zinc) produced more than 500 million tons of waste in area
- Two primary types of wastes from mining processes: chat and fine tailings
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FOR EVERY 1 TON OF ORE EXTRACTED, APPROXIMATELY 16 TONS OF CHAT AND TAILINGS WAS LEFT BEHIND
TAR CREEK SUPERFUND SITE
REMEDIAL ACTION ACTIVITIES
CATHOLIC 40

• “Catholic 40”
• Tribal Trust Land
• 40-acre parcel owned by the Quapaw Tribe of Oklahoma and was set aside in 1892 to the Catholic Church for religious and education purposes. In that same year, St. Mary’s of the Quapaw, a Catholic Church, a cemetery, and a boarding school was established.
• St. Mary’s operated up until 1927, following abandonment, the church leased the property for mining in 1937.
• In 1975, the Catholic Church deeded the property back to the Quapaw Tribe of Oklahoma.
REMEDIAL ACTION ACTIVITIES
CATHOLIC 40

A.3.2. Building 2: St. Mary's of the Quapaw school, three-story school and dormitory.

A.3.7. Building 8: St. Mary’s of the Quapaw school, chapel/classroom/dorm

Figure A-8: St. Mary's of the Quapaw school, Building 2 (1915 Dormitory Building), view northwest of fallen wall section and interior floor support walls.

Figure A-9: St. Mary’s of the Quapaw school, Building 2 (1915 Dormitory Building), view east of interior wall frame fallen into the interior of the structure.

Figure A-18: St. Mary’s of the Quapaw school, Building 8, view south of north façade with upper stairway landing with arched entrance of stairway to lower story. Above at right may have been for firewood.

Figure A-19: St. Mary’s of the Quapaw school, Building 8, view southwest of the east elevation and part of the north façade.
The Quapaw Tribe Environmental Office, retained the services of a consulting engineering firm to assist in generating plans and specifications, and other pre-construction documents.

Remedial Action began in December 2013 and involved: excavation, hauling, and disposal of approximately 107,000 tons of source material (chat).
REMEDIAL ACTION ACTIVITIES
CATHOLIC 40
REMEDIAL ACTION ACTIVITIES
CATHOLIC 40

- Confirmation Sampling
- Soil amendments added to TZ soils to reduce Bioavailability of Metals
  - Agricultural Lime
  - Chicken Litter, and
  - Mushroom Compost
- Common Grass Seeding
  - Fescue
  - Rye
  - Bermuda
TOTAL TONS REMOVED BY TRIBE SO FAR

<table>
<thead>
<tr>
<th>Location</th>
<th>Tons</th>
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<tbody>
<tr>
<td>Catholic 40</td>
<td>107,310</td>
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<tr>
<td>Beaver Creek North</td>
<td>60,193</td>
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<tr>
<td>Distal 6a</td>
<td>83,838</td>
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<tr>
<td>Distal 7 North</td>
<td>4,251</td>
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<tr>
<td>Beaver Creek URT1</td>
<td>103,667</td>
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<td>Distal 13</td>
<td>759,937</td>
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<td>Distal 10-12</td>
<td>442,212</td>
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<tr>
<td>Elm Creek URT1</td>
<td>180,892</td>
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<td><strong>Total</strong></td>
<td><strong>1,742,300</strong></td>
</tr>
</tbody>
</table>

2018 341,778 (through 7-30-18)
What Are Transition Zone Soils?

- Soils that are under or around a chat pile or base
- Exposed to dissolved metals for decades
- Often higher concentrations than the chat itself
APPROACHES TO MEETING THE OBJECTIVES OF THE ROD

- How are we ensuring that the objectives of the Record of Decision are being accomplished?
  - Confirmation Sampling and additional excavation
  - Eco-Risk evaluation and raising of Cadmium and Zinc goals
  - Screening with X-Ray Fluorescence
  - Conducting research to raise the remedial goals while still being protective of tribal use.
Ecological Risk Values

- Record of Decision Goals
  - Lead 500 mg/kg
  - Zinc 1,100 mg/kg
  - Cadmium 10 mg/kg

- Driving factors
  - Human health risks
  - Tribal use scenario

- Ecological Risk Goals
  - Lead 800 mg/kg
  - Zinc 5,500 mg/kg
  - Cadmium 38 mg/kg

- Ecological factors
  - Shrew
    - 1 acre home range
  - Woodcock
    - 15 acre home range
For example: Distal 12
Transition Zone Soil example

- Distal 12
  - 19 elevated grids
  - 13 zinc eco-risk grids
    - Saved 26,000 tons of topsoil
  - 6 excavated grids
    - 1 lead
    - All 6 had elevated cadmium
Crop Bioavailability Study

- EPA partnering with the Tribe and Jacobs Engineering to conduct research on row crops and pasture grasses for metal bioavailability
- Began in June 2018 – ongoing
- Sampling
  - Corn
  - Winter Wheat
  - Soybeans
  - Pasture grass
- Sampling (con’t)
  - Remediated properties
  - Background properties
  - Looking for “normal” farming practices

Goal of the study is to determine if raising the remedial goals will still be protective of human health and the environment, including tribal use scenarios.
GIS Kriging - Moving Window
Which option works best?

- It depends on the site!
  - Sites with shallow bedrock do well with soil amendments
  - Sites with ample material do well with eco-risk values
  - Complex sites work well with moving window approach
  - XRF screening has reduced the amount of material removed by pinpointing hot spots
Grids by the Numbers

- **Soil amendments**
  - Utilized on 54 grids
    - Saved 55,000 tons topsoil

- **Eco-risk values**
  - Zinc
    - Utilized on 36 grids
    - Saved 59,000 tons

- **% Contaminant Elevated above PRGs**
  - 28% Lead
  - 84% Zinc
  - 66% Cadmium

- **Elevated Grids**
  - 43% excavated
  - 31% soil amendments
  - 21% eco-risk
  - 5% depth average/deep till
  - <1% capped
FUTURE WORK AT SITE

- Based on the Tribe’s performance at the Catholic 40 and at subsequent RA sites, the Tribe is now performing all remediation at the site.

- Elm Creek Watershed
  - Within the next 5 years, the Tribe is projected to remediate over 1.2 million tons of mine waste concentrating on the Elm Creek watershed (represents close to $24 million of EPA funding).
  - Operable Unit 5 (sediments) in the RI process. Tribe anticipates having the same leadership roll in remediation of OU5
Before and After
Goal: reduce water treatment via reduction of footprint and promotion of runoff
Midnite Mine - Conceptual Final Surface and Structures - Northern Area
Pits Scheduled for Backfill
Tentative Injection Sites for Hydrogeologic Control
THANK YOU!!!

QUESTIONS and/or COMMENTS???

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