The Proposed Alternative

This Source Control Proposed Plan identifies Excavation, Treatment, and Offsite Disposal as the preferred alternative for addressing source contamination at the Wilcox Oil Company Superfund Site (site), Bristow, Oklahoma (Figures 1, 2 and 3). This action is limited in scope to addressing tank waste and lead additive area sources and is not the final remedy for the site (Figures 4 and 5). This action is considered an early final action for the tank waste due to the complete removal of the tank waste source material, and is considered an interim action for lead because only source material in the lead additive area is being addressed. Final site-wide remediation with respect to lead, along with other subsequent actions needed to address the threats posed by conditions at this site, will be documented in a future final site-wide decision document.

By taking this source control action early in the Superfund process, significant human health and ecological risk reduction will be accomplished through the removal of primary sources located throughout the site at or near the soil surface, specifically residential properties. In addition, further migration and environmental degradation of adjacent waterways (e.g., Sand Creek and the East Tributary), wetlands, and stream riparian areas is mitigated.

Details of the Preferred Alternative

- Estimated Present Worth cost is $4,135,294.
- Approximately 30,362 cubic yards (y3) of source material will be excavated and transported to an offsite permitted non-hazardous disposal facility. The estimated volume of tank waste is 28,093 y3 while the estimated volume in the lead additive area is 2269 y3.
- The lead additive area is identified as a characteristic waste and will be treated through Solidification/Stabilization to address the lead prior to offsite disposal.
- The excavated areas will be backfilled with clean soil from an offsite location and re-vegetated. All excavated areas will be graded for drainage and appropriate erosion controls implemented.
- The target health-based levels are 800 milligrams per kilogram lead and 0.11 mg/kg benzo(a)pyrene.
- This action addresses 3 Residential Properties, 5 migration Pathways to the Creek, and 9 Sources.

The EPA consulted with the Oklahoma Department of Environmental Quality (ODEQ), Muscogee (Creek) Nation, Cherokee Nation, and Sac and Fox Nation to coordinate review and discussion of this proposed action.

Source Material

Tank Sludge/Solid Waste

Data collected during historic and current site investigations show that refinery operations resulted in the presence of tank sludge/solid waste that can be either a contaminated oily tar-like viscous liquid and/or a black dry solid (Figures 4a - c). The tank sludge/solid waste is found throughout the property at various locations, primarily associated with former tank storage locations (Figure 5). Both the liquid and solid forms are found at and below the surface to depths estimated as deep as 6 feet below ground surface (bgs). The oily tar-like viscous liquid present at or just below a thin layer of soil migrates to the surface and spreads out when heated by the summer sun. Results for samples collected from the tank waste are as high as 3,660 milligrams per kilogram (mg/kg) lead, 20 mg/kg Benzo(a)pyrene, 1,400 mg/kg 2-methylnaphthalene, and 875,000 mg/kg total petroleum hydrocarbons.

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Lead additive area
In addition to the tank waste, an area located on the Wilcox Process area is contaminated with high levels of lead and phenols (Figures 4d and 5; LMS, 2016). This area is denuded of vegetation and covered by silty sparkling sand and a white, salt-like substance (LMS, 2016). Significant surface erosion from this area extends to the south towards Sand Creek. According to the Sanborn Maps, acid tanks were located in this area as well. Lead results for samples collected during site investigations range as high as 43,200 to 105,000 mg/kg (Weston 1997; ODEQ, 2012; EPA, unpublished) and indicate that lead leaches above regulated limits for land disposal.

A total of 9 source areas (Figure 5) are identified for source control action under this proposal: Two (2) are within 225 - 300 feet of a residence, 5 are within 225 feet of either Sand Creek or the East Tributary that drains to Sand Creek, 1 is located on a residential property, and the last is located within a cow pasture. Fencing currently restricts and limits direct exposure for the short-term.

Areas of Remediation – Estimated Volume	
Area Name	**Volume Estimated (cubic yards)**
Lorraine Waste	953
Lead Additive Area	2,269
Tank 1	3,323
Tank 3	3,608
NTF-1	818
Tank 10	9,902
Tank 11	431
Tank 12	4,788
Pit 1	4,270
Total	30,362 (5 Acres)
NTF=north tank farm	

Site Risk
Lead and benzo(a)pyrene are selected as the contaminants of potential concern. Lead is present throughout the lead additive area and exceeds the soil health-based target level. Benzo(a)pyrene is a polycyclic aromatic hydrocarbon (PAH) present in the tank waste and is carcinogenic to humans based on strong and consistent evidence in animals and humans (EPA, 2017b). Benzo(a)pyrene is selected as the representative contaminant for the PAH group because of its low soil health-based target level, it is most commonly detected in the tank waste, and it is co-located with the other PAHs.

Source Control Remedial Action Objectives (RAOs)
RAO No. 1 - Prevent ingestion and dermal contact exposure to human and ecological receptors through the removal of tank waste to reach a target health-based concentration of 0.11 mg/kg benzo(a)pyrene and the removal of the lead additive area to reach a target health-based concentration of 800 mg/kg lead.
RAO No. 2 - Prevent further migration of soils, sediment, and indoor air through the removal of tank waste to reach a target health-based concentration of 0.11 mg/kg benzo(a)pyrene and the removal of the lead additive area to reach a target health-based concentration of 800 mg/kg lead.
RAO No. 3 - Removal of source materials to eliminate and prevent further degradation of the surrounding environment as a result of exposure to or migration from tank waste and the lead additive area.

By preventing exposure, contaminant migration, and environmental degradation through removal, treatment, and offsite disposal, this alternative meets the RAOs; reduces toxicity, mobility, and volume; is permanent; and is effective in the long-term. Implementation requires standard construction equipment, utilizes commercially and readily available services, satisfies the RAOs in the least amount of time, and does not require specialized equipment. The source control action would not require long-term monitoring, site inspections, or O&M, due to the removal of contamination from the site. However, since the final risk assessment for lead has not been completed, the lead concentrations remaining after the lead interim action may not support residential use. Until a final risk assessment and

final decision document are completed, the property will remain fenced and will not be used for residential purposes. This is not the final remedy for the site and contaminants will remain onsite until the final remedy is implemented; therefore, five-year reviews will be required. This alternative is compatible with current (residential, industrial, agricultural, etc) and expected future uses (residential, industrial, agricultural, etc).

Alternatives Evaluated

Summary of Source Control Remedial Alternatives		
Alternative Designation	**Description**	**Estimated Cost**
1	No action	$0.00
2	Excavation, Treatment, and Offsite Disposal	$4,135,294
3	Excavation, Treatment, Consolidation, and Capping	$4,633,269

Site History and Background

The site is an abandoned and mostly demolished oil refinery located northeast of Bristow, Creek County, Oklahoma (Figure 1; EPA, 2013). The approximate geographic coordinates for the site are 35°50’31” North latitude and 96°23’02” West longitude. The site spans approximately 140 to 150 acres located in the N ½ of the NW ¼ of S29 T16N R9E and the SW ¼ of the SW ¼ of S20 T16N R9E in Creek County, Oklahoma (EA, 2016).

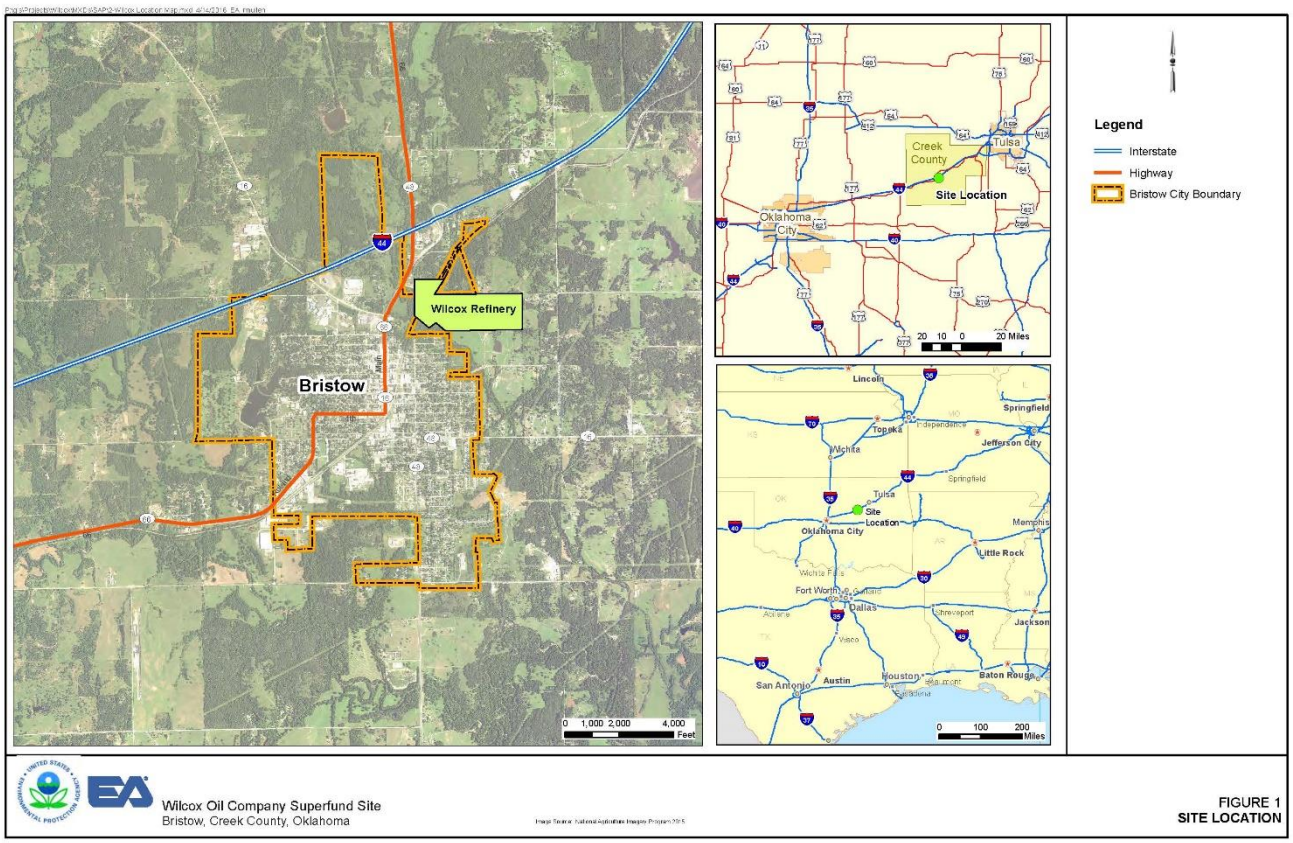
Records indicate the property was used for oil refinery operations from 1915 until November 1963 (ODEQ, 1994), and consisted of two refinery process areas and two tank farm storage areas (Figure 2). Oil refining began in 1915 at the Lorraine Refinery followed by operations at the Wilcox Oil Refinery. The Wilcox Oil Company expanded when it acquired the Lorraine Refinery in 1937.

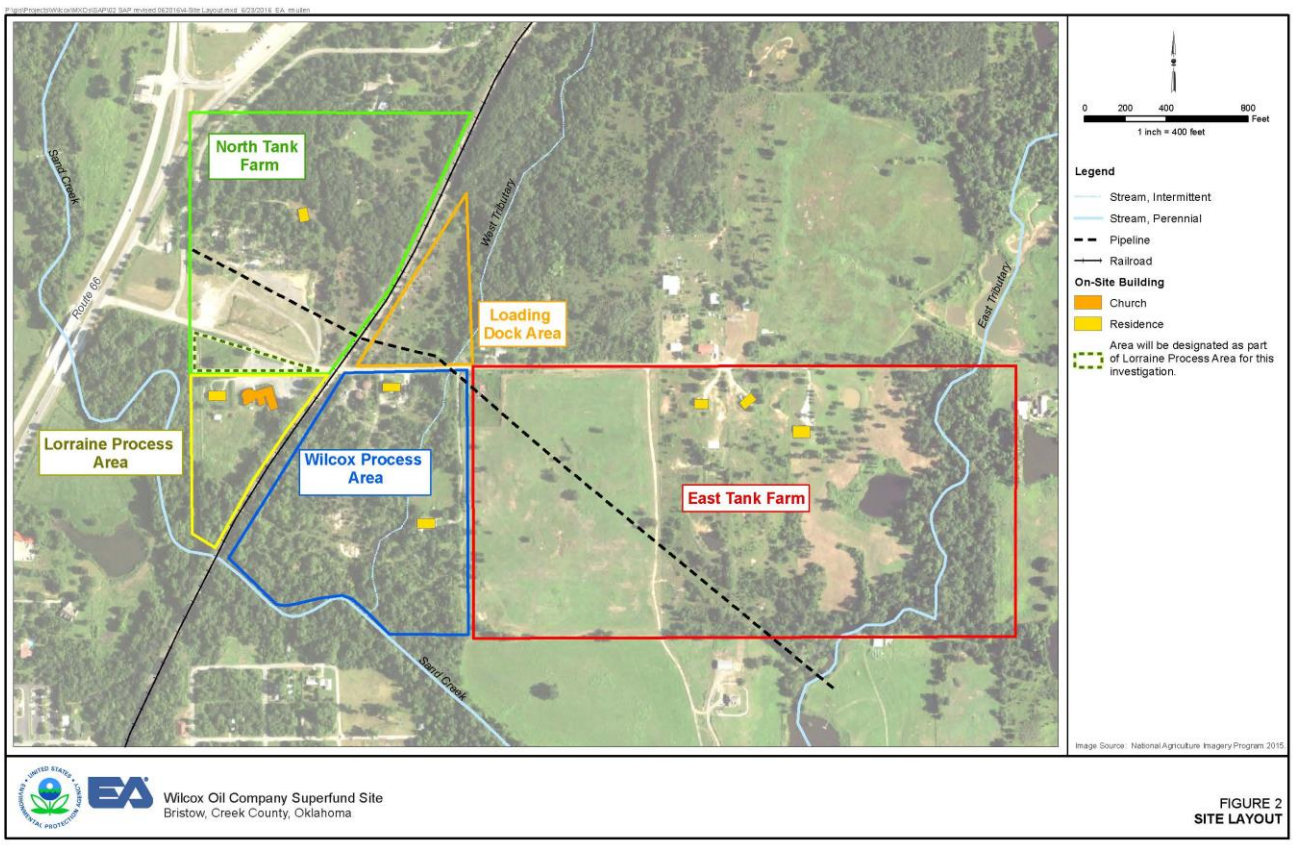
Sanborn Fire Insurance Maps (EA, 2016) show the properties contained approximately 80 storage tanks of various sizes, a cooling pond, and approximately 10 buildings housing refinery operations. The maps also indicate that crude oil, fuel oil, gas oil, distillate, kerosene, naphtha, and benzene (petroleum ether) were all stored on the property (ODEQ, 1994).

After the refinery operations ceased and most of the tanks and buildings were demolished and sold for scrap, the property was sold to private interests (ODEQ, 1994). Beginning in 1975 with the construction of a church and parsonage, private residences were constructed on six parcels of land that were part of the former refinery operations, with the most recent being constructed in 2003/2004. One of these residences is the former office/lab building associated with the refinery. As a result, there are seven residential properties located within former tank or refinery operation areas, three of which are occupied and one periodically rented. In addition, two occupied residential properties on the eastern portion of the site (East Tank Farm) use water from domestic/private wells (ODEQ, 1994).

The EPA completed two searches for potentially responsible parties, and identified five. The EPA offered the parties the option to negotiate performance of the work. All parties declined. Based on these responses and site research, the Agency determined that further negotiations would not move the project forward in a timely manner; therefore, the site remedial investigation (RI) and feasibility study (FS) is being completed as an EPA fund-lead project.

On May 24, 2013, EPA proposed the site to the National Priorities List (NPL). On December 12, 2013, the site officially became a Federal Superfund Site (EPA Identification No. OK0001010917), when it was added to the NPL.


Wilcox Refinery
Bristow
Creek County
Tulsa
Site Location
Oklahoma City
20 10 0 20 Miles
Lincoln
Springfield
Topeka
Wichita
Jefferson City
Tulsa
Site Location
Oklahoma City
Memphis
Little Rock
Fort Worth
Dallas
Jackson
San Antonio
Austin
Houston
Baton Rouge
0 100 200 Miles
0 1,000 2,000 4,000 Feet
Legend
Interstate
Highway
Bristow City Boundary
Wilcox Oil Company Superfund Site
Bristow, Creek County, Oklahoma
FIGURE 1
SITE LOCATION


North Tank Farm
Sand Creek
Route 66
West Tributary
Loading Dock Area
East Tributary
Lorraine Process Area
Wilcox Process Area
East Tank Farm
Sand Creek
0 200 400 800 Feet
1 inch = 400 feet
Legend
Stream, Intermittent
Stream, Perennial
Pipeline
Railroad
On-Site Building
Church
Residence
Area will be designated as part of Lorraine Process Area for this investigation.
Image Source: National Agriculture Imagery Program 2015
Wilcox Oil Company Superfund Site
Bristow, Creek County, Oklahoma
FIGURE 2
SITE LAYOUT

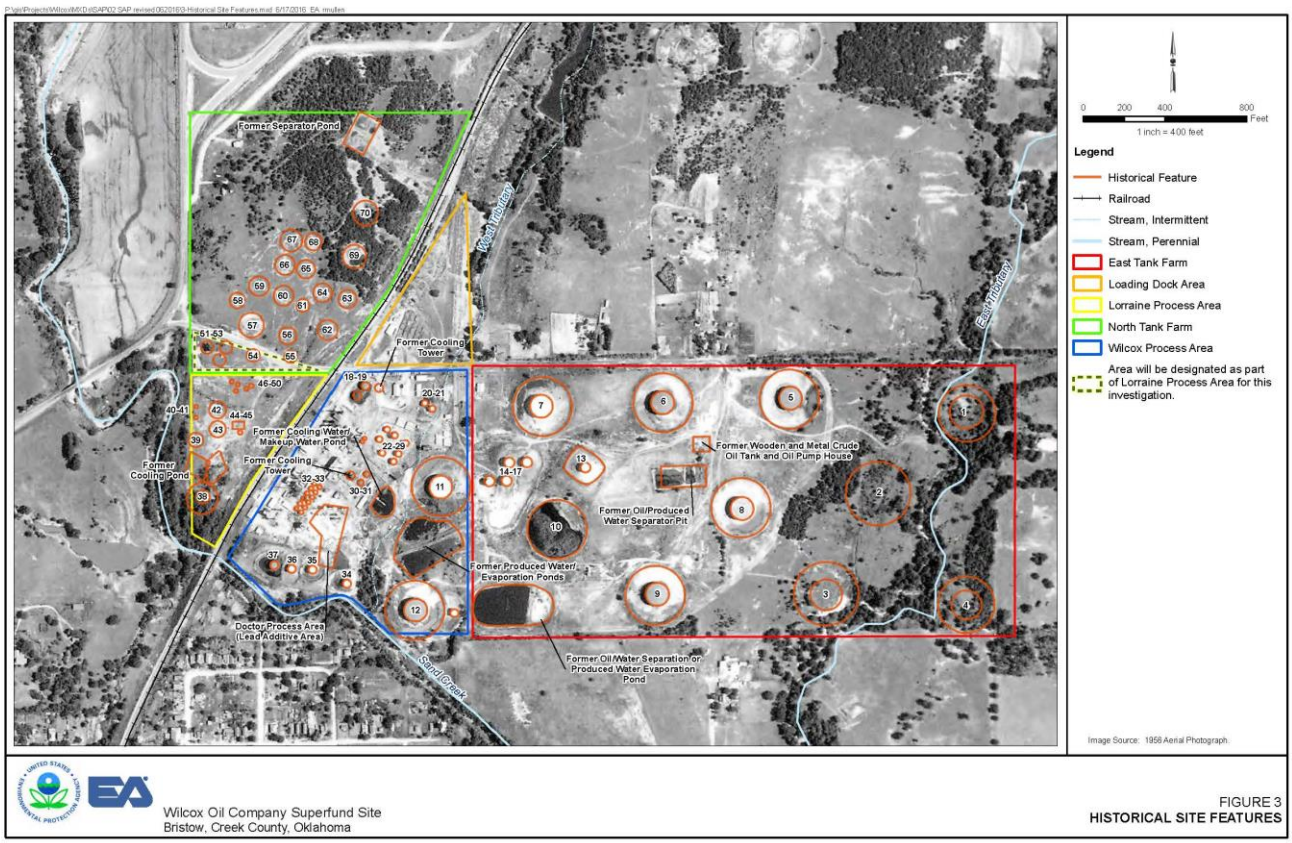


Figure 4a: Waste material at surface.

Figure 4b: Waste material at surface.

Figure 4c: Waste material at surface.

Figure 4d: Lead Sweetening Area

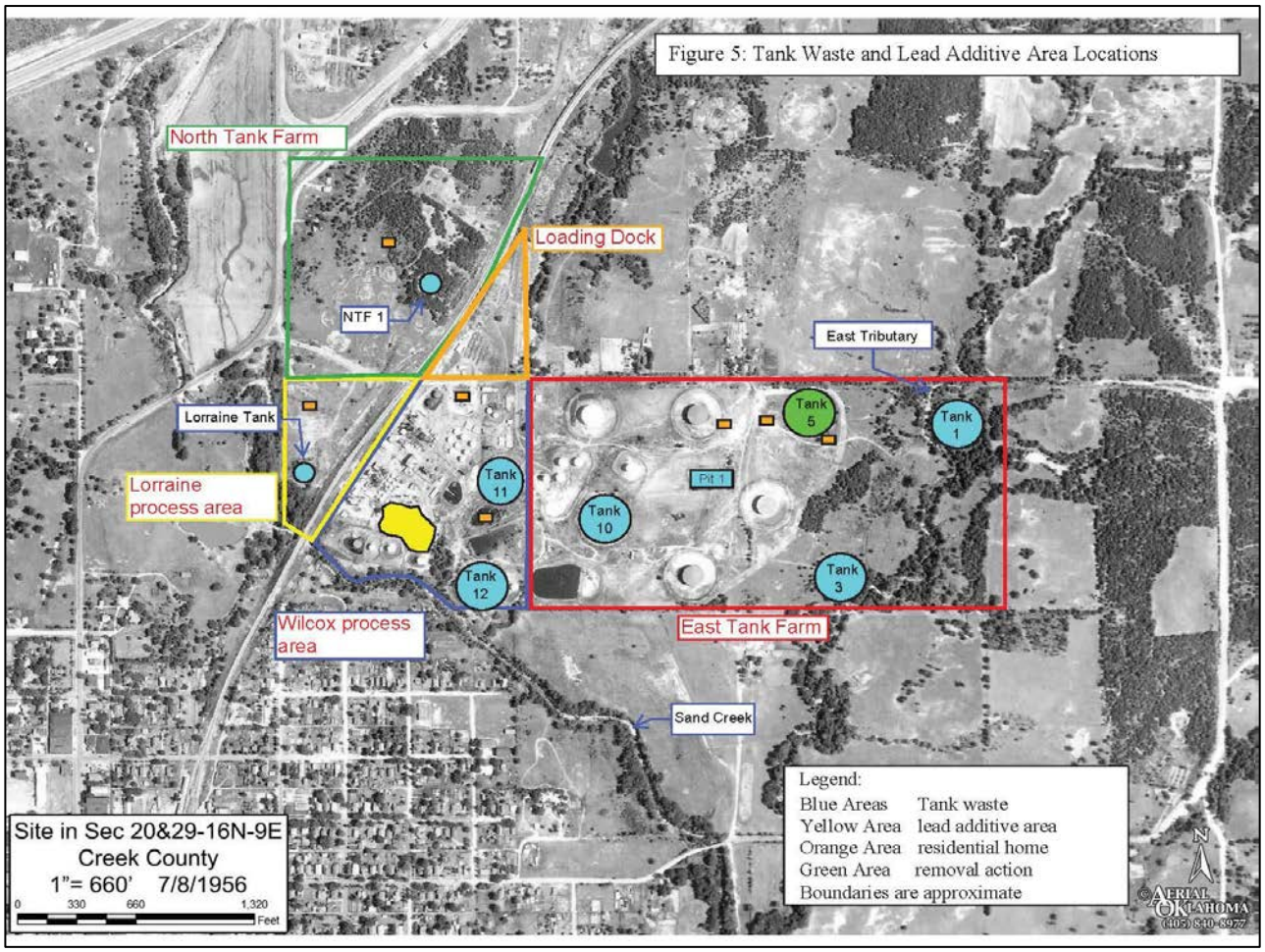


Figure 5: Tank Waste and Lead Additive Area Locations
North Tank Farm
Loading Dock
NTF 1
East Tributary
Lorraine Tank
Lorraine process area
Tank 5
Tank 1
Tank 11
Pit 1
Tank 10
Tank 12
Tank 3
Wilcox process area
East Tank Farm
Sand Creek
Site in Sec 20&29-16N-9E
Creek County
1"= 660' 7/8/1956
0 330 660 1,320 Feet
Legend:
Blue Areas Tank waste
Yellow Area lead additive area
Orange Area residential home
Green Area removal action
Boundaries are approximate
N
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