Agenda

► SITE HISTORY
► LEAD REMEDIATION WORK
► LANDFILL CLOSURE
  • AGENCY COLLABORATION AND VALUE ENGINEERING
  • BENEFICIAL REUSE OF LANDFILL USING SOLAR
  • WHAT WE LEARNED FROM LEAD REMEDIATION
  • BRACKETING THE UNKNOWNS
“Old” Shooting Range Landfill
Timeline of Site Development

- Gravel Mining Operations
- Chuck-O-Luck Sporting Club Ownership
- Adams County Ownership
- Adams County Landfill Operation
- 30" Stormsewer Operation
- Construction and Demolition Debris Disposed on Landfill
- Anadarko Pipeline Easement
- Texas Tea O&G Well Production
- Sheriff’s Shooting Range
- Construction of Site Structures
Pre-Remediation Property Conditions
Preparatory Activities

- Blowdown and Abandon 4” O&G Pipeline
- Abandon Texas Tea O&G Production Well
- Relocate United Power Poles
- Abandon Commercial Well
Firearms Training Facilities (Lead-impacted Soil)

South Range

North Range

SWAT Training Area

Tactical Training Area
Structures And Debris Piles
Site Characterization Activities

- 30” CMP integrity
- Groundwater flow direction
- Shallow and deep groundwater quality (onsite and offsite)
- Surface water quality
- Landfill gas – VOCs (TO-15)
- Soil and sediment

Shooting Range COCs

- Waste limits
Site Plan
## Site Characterization Summary

<table>
<thead>
<tr>
<th>WASTE MATERIAL</th>
<th>DISPOSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,158 cy of Excess-Risk Soil and Bullet Piles</td>
<td>Screen and Treat, then Soil Placement Area</td>
</tr>
<tr>
<td>700 cy of Munitions Debris Soil</td>
<td>Soil Placement Area</td>
</tr>
<tr>
<td>13 Structures (1 with ACM)</td>
<td>Off-Site Permitted Landfill</td>
</tr>
<tr>
<td>Asphalt and Concrete Range Floor (South Range)</td>
<td>Soil Placement Area</td>
</tr>
<tr>
<td>Miscellaneous Debris Piles</td>
<td>Off-Site Permitted Landfill</td>
</tr>
<tr>
<td>Waste Tires</td>
<td>Tire Recycler</td>
</tr>
</tbody>
</table>
South Range Design Cut Depths

Cut Depth (inches bgs)

- 0
- 6
- 12
- 18
- 24
- 30

Bullets and Shell Casings on Ground Surface

South Range Safety Fan

1 inch = 60 feet

Feet

0 60 120

ADAMS COUNTY BURNS MCDONNELL

QUANTUM WATER & ENVIRONMENT
Remediation – Main Elements

- Establish stormwater BMPs
- Remove RBMs from structures and recycle
- Demolish and remove structures
- Pump out septic tank and abandon in place
- Surficial lead recovery from South Range Safety Fan
- Excavate soils under cap to EPA Industrial Risk Regional Screening Levels (RSL)
Remediation – Main Elements (Cont.)

- Excavate soils not under cap to Residential RSL
- Screen lead and recycle
- Stabilize Excess Risk Soils
- Consolidate treated soil and MD soil in Soil Placement Area
- Remove debris piles
- Demolish South Range pavement and consolidate in Soil Placement Area
- Temporary soil cover over Soil Placement Area
Overview Of Soil Remediation
# Final Remediation Volumes

<table>
<thead>
<tr>
<th>WASTE MATERIAL</th>
<th>DISPOSITION</th>
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</thead>
<tbody>
<tr>
<td>2,200 cy of Excess-Risk Soil and Bullet Piles</td>
<td>Screen and Treat, then Soil Placement Area</td>
</tr>
<tr>
<td>700 cy of Munitions Debris Soil</td>
<td>Soil Placement Area</td>
</tr>
<tr>
<td>13 Structures (1 with ACM)</td>
<td>Tower Road Landfill</td>
</tr>
<tr>
<td>Asphalt and Concrete Range Floor (South Range)</td>
<td>Soil Placement Area</td>
</tr>
<tr>
<td>360 cy of Railroad Ties and Power Pole Debris</td>
<td>Various Recyle/Disposal Facilities</td>
</tr>
<tr>
<td>6,600 Waste Tires</td>
<td>GeoCycle LLC, Colo. Spgs.</td>
</tr>
<tr>
<td>40,108 lbs Bullet Lead</td>
<td>Three Sisters Trading, Lake Forest, IL</td>
</tr>
<tr>
<td>40,600 lbs Scrap Iron</td>
<td></td>
</tr>
<tr>
<td>23 Drums of Investigation Wastes</td>
<td>Soil Placement Area</td>
</tr>
<tr>
<td></td>
<td>6 Drums treated first</td>
</tr>
</tbody>
</table>
Landfill Closure

► Agency Collaboration And Value Engineering
  • Recreating Historic Drainage Through Site
  • Onsite Waste Relocation
  • Landfill Cover Material

► Beneficial Reuse Of Landfill Using Solar

► What We Learned During The Lead Remediation
  • Asbestos Containing Material (ACM) Present
  • Literally Lead Everywhere

► Bracketing The Unknowns
  • Swale Alignment Borings
  • Waste Test Pits
  • Material Management Plan
Recreating Historic Drainage

- ~150 acre watershed
- ~142 cubic feet per second (cfs)
  - 100-year, 24 hour storm event

Todd Creek Farms Subdivision
Grading and Site Plan

- Potential to bore new storm drain
- Excavating waste to create channel for stormwater
Landfill Cover Material

- Adams county animal shelter project
- Source for Water Balance Cover material

Approx. 3.5 miles
Landfill Cover Material

- Flatrock Training Center
- Source for geosynthetics subgrade and cover material

Approx. 14 miles
The Solar Six

- Colorado school of mines capstone design project
  - Landfill cover system analysis
  - Solar support system analysis
  - Solar racking system analysis
  - Solar efficiency analysis
Landfill Cover with Solar Design

The Solar Six
Colorado School of Mines Capstone Project

Future Solar Developer
Grading Plan with Solar Areas

- 1-2 MW solar farm
- Potential for battery storage
- Access to United Power infrastructure
What We Learned From the Lead Remediation

- Asbestos Containing Material (ACM)
- Lead Everywhere
Bracketing the Unknowns

- Site Assessment and Closure Plan Report
- Storm Drainage Swale Test Pits
- Storm Drainage Swale Alignment Borings
- Materials Management Plan
- ACM Areas Map

- Communication with Adams County and CDPHE on findings
  - Discuss next steps and options
- Making sure construction documents account for discovering the unknown
Landfill Closure and Solar Reuse Construction

Community and Economic Development

ADAMS COUNTY

AMERESCO
Solar Farm Development

Hazardous Materials and Waste Management Division

Solid Waste
RCRA

Iron Woman Construction and Environmental Services LLC

Landfill Closure Construction

CDPHE
Department of Public Health & Environment

Quantum Water & Environment

Burns & McDonnell

Landfill Cover CQA
Asbestos Monitoring

DS Environmental Consulting
Drone Site Photo

Photo Credit: Iron Woman Construction
Site Renderings
Site Renderings
Site Renderings
Site Renderings
Questions?

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