Poultry Lagoon Closure Case in Progress

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USDA-NRCS
Temple, Texas

Background Information
- Caged egg-laying operation with 6 houses
- Lagoon size – unknown
  - 11 to 12 acre-ft of storage (size of football field 10 feet deep)
- Operation began in late 1970’s
- Operator chose to shut-down facility in May 2006
- Demonstration project
  - Determine costs for other lagoons across the state
  - Address concerns in an impaired watershed
  - Properly close to mitigate water quality impacts

The archived presentation is available at:
http://www.extension.org/pages/21819/chronological-webcast-archive
Contracting – Turn Key

- Sludge to be removed and land applied – 18,500 CY
- Removal of Concrete Slabs
- Earth moving – compacted fill estimated at 27,000 CY
- Final Seeding of Site
- Bids received began around $1.8M and exceeded $3M

Cost to Date (Phase 1, 2 & 3)

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
<th>Component per unit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sludge and Water Removal – stockpile on-site</td>
<td>18,000 CY</td>
<td>$3.25/CY</td>
<td>$58,500</td>
</tr>
<tr>
<td>Wastewater</td>
<td>None</td>
<td>$10/1,000 gallons</td>
<td>N/a</td>
</tr>
<tr>
<td>Sludge Hauling and Application</td>
<td>12,103 Tons</td>
<td>$7.484/Ton</td>
<td>$90,580 (basically $5.03/CY)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal for removal</td>
<td></td>
<td></td>
<td>$149,080</td>
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<tr>
<td>Concrete Slab Removal</td>
<td>1,800 CY</td>
<td>$11.60/CY</td>
<td>$20,880</td>
</tr>
<tr>
<td>Earthwork</td>
<td>27,200 CY</td>
<td>$2.50/CY</td>
<td>$68,000</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td>$2,100</td>
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</tr>
<tr>
<td>Subtotal for Site Work</td>
<td></td>
<td></td>
<td>$90,980</td>
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<tr>
<td>TOTAL TO DATE</td>
<td></td>
<td></td>
<td>$240,060</td>
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</table>
Additional Costs

- Engineering – Surveying, Civil 3D, Drawings, Specifications, Design Report
- Closure Plan Development
- Contracting Time and Expenses
- Meetings, coordination, and other communication time
- Soil, Waste, and Wastewater Analysis
- Moving Power Lines
- Final Establishment of Vegetation

Methodology

- Survey of existing site
  - Determine extents of lagoon
  - Approximate volumes
  - Utilities
- Soil sampling to determine in-situ materials and check for leakage
- Construction Specifications
  - Site-specific
  - Compilation of appropriate portions of NRCS national construction standards

Methodology (continued)

- Draft Closure Plan and approval
- Construction Plans
- Contracting
- Construction Oversight
- Final Check-out

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SLUDGE ANALYSIS 2006

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<thead>
<tr>
<th></th>
<th>Range</th>
<th>Average</th>
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<tr>
<td>Nitrogen (%)</td>
<td>1.2-2.8</td>
<td>2.11</td>
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<tr>
<td>Phosphorus (%)</td>
<td>4 - 4.7</td>
<td>4.4</td>
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<tr>
<td>Potassium (%)</td>
<td>1.8 - 3.8</td>
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<tr>
<td>Calcium</td>
<td>16.6 - 38.9</td>
<td>21.8</td>
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<tr>
<td>Magnesium (%)</td>
<td>1.7 - 2.4</td>
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<tr>
<td>Sodium (‰)</td>
<td>0.5 - 0.7</td>
<td>0.6</td>
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<tr>
<td>Zinc (%)</td>
<td>0.06 - 0.19</td>
<td>0.14</td>
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<tr>
<td>Iron (%)</td>
<td>0.45 - 1.0</td>
<td>0.6</td>
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<tr>
<td>Copper (ppm)</td>
<td>81 - 281</td>
<td>197.7</td>
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<tr>
<td>Manganese (%)</td>
<td>0.1 - 2.2</td>
<td>1.8</td>
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<tr>
<td>pH</td>
<td>7.0 - 7.3</td>
<td>7.2</td>
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<tr>
<td>Conductivity</td>
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<tr>
<td>Total Carbon (%)</td>
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<tr>
<td>Dry Matter (%)</td>
<td>24 - 53</td>
<td>33.6</td>
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<tr>
<td>P2O5 (dry ton)</td>
<td>185-210</td>
<td>200</td>
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<tr>
<td>P2O5 (wet ton)</td>
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WASTEWATER ANALYSIS 2006

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<td>3171</td>
<td>479.7</td>
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<td>P</td>
<td>5.76</td>
<td>7.04</td>
<td>1.079</td>
<td>4.967</td>
<td>7.6</td>
<td>16580</td>
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<tr>
<td>K</td>
<td>4.0</td>
<td>7.04</td>
<td>1.079</td>
<td>4.967</td>
<td>7.6</td>
<td>16580</td>
</tr>
<tr>
<td>Ca</td>
<td></td>
<td></td>
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<td>16980</td>
<td>0.282</td>
</tr>
<tr>
<td>Mg</td>
<td></td>
<td></td>
<td></td>
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<tr>
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<td>901</td>
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<tr>
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<td>7.8</td>
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<td>Conductivity</td>
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<td>16580</td>
<td>0.282</td>
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<td>0.1525</td>
<td></td>
</tr>
<tr>
<td>P2O5</td>
<td>381-348</td>
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</tr>
</tbody>
</table>

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How many lagoons?

Aerial Photo Reconnaissance

Source: 1960 Aerial Photo

Digging for Information

- Field Engineer Technician
- Located the contractor that originally built the facility
- Confirmed that there were two lagoons
- No plans available
- Found out when water was hooked up for the site 1978

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Soil Sampling

Surveying Attempts
- Tried to use Sludge Judge – nothing went into the tube
- Tried pacing and using a range pole to establish depth
- Used Survey Grade GPS unit
  - Took Surface Shot
  - Used range pole to probe and determined
    - Depth of sludge
    - Depth of wastewater

Don’t Forget Power Lines
Survey Data Collected & CAD
- Approximately 2,000 data points were collected or calculated (34 different field codes were used)
- Approximately 200 points were taken on the surface and probed to obtain bottom of pond elevation and wastewater level
- Modeled
  - Existing Pond with Sludge
  - Bottom of Pond
  - Wastewater Level in Pond
  - Proposed Final Grade
  - Existing Concrete Slabs

Closure Plan
- Meetings with TCEQ
- Review of draft plan approved by TCEQ
- Final closure plan to be completed after vegetation is established

The archived presentation is available at:
http://www.extension.org/pages/21819/chronological-webcast-archive
Site Specific Construction Specifications – March 2008

Overview
- Scope & Location
- Utilities
- Safety
- Pollution Control
- SWPPP
- Mobilization and Demobilization

Site Specific Construction Specifications – March 2008

Overview (continued)
- Removal of litter, sludge and wastewater
- Structure Removal
- Earthfill and Excavation
- Seeding and Mulching
- Construction Survey

Contracting – Phase 1

- Modified to only include removal and stockpiling of sludge in windrows on-site
- Awarded Bid
  - $3.25 per CY of sludge removed
  - $10 per 1,000 gallons of water for pumping to neighbor
  - Local SWCD found neighbor to take water
- Total cost $58,500
- Completed September 2009

The archived presentation is available at:
http://www.extension.org/pages/21819/chronological-webcast-archive
Bid Closes and what happens

The archived presentation is available at:
http://www.extension.org/pages/21819/chronological-webcast-archive
Empty Lagoons

Stockpiled Manure

Empty Lagoons

**Sludge Analysis - 2009**

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<thead>
<tr>
<th></th>
<th>% (dry basis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>1.5</td>
</tr>
<tr>
<td>P</td>
<td>5.7</td>
</tr>
<tr>
<td>K</td>
<td>1.6</td>
</tr>
<tr>
<td>Dry Matter</td>
<td>74%</td>
</tr>
</tbody>
</table>
Phase 2 – Sludge Hauling and Land Application

- Local SWCD, NRCS and TSSWCB and found a landowner that wanted the material
- Landowner receiving sludge contracted out of their own pocket to have sludge hauled and spread on their property
- Sludge hauler was from the Texas Panhandle
  - Some of the cost was for mobilization/demobilization
- Application started January 2011 and was postponed because of rainfall until April 2011

Slabs to be removed

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Phase 3 – Final Grading
- Contract Awarded August 2011
- Final grading completed September 2011
- DOES NOT INCLUDE SEEDING AND REVEGETATION – currently in a drought
- Silt fencing is in place

Challenges for Final Grading
- Power poles on-site
  - Agreement was from 3 years ago when initially bid
  - Had to renegotiate cost with power company

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Phase 4 – Vegetation and Paperwork

- Vegetate the site
- Landowner deed recordation
- Final Closure Plan

Thank you!

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