Implementing Fully Integrated Waste Management Solutions Direct At Source in Oil Sands Operations.
AGENDA

• Tervita – Integrated solutions for oil sands operations
• Waste Production in Oil Sands Operations
• **Where to start?** Detailed waste assessment audit
  
• **What is an audit?** What does it accomplish, what are the benefits?
• **Onsite management model:** Treat waste direct at source
• **Selecting a waste partner:** Key considerations for selecting a full lifecycle waste management partner

• **The Facts & Figures:** Case Study – Real metrics from a real project
INTEGRATED SOLUTIONS FOR OIL SANDS
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Geotechnical Drilling Services
Energy Marketing
Well Servicing
Sulphur Services
Oilfield Equipment Rentals
Pipeline Integrity & Compliance
Drilling & Coring Services
Metals Recycling
INTEGRATED SOLUTIONS FOR OIL SANDS

Remediation & Reclamation
Demo & Decommissioning
Civil & Environmental Construction
Construction Drilling & Shoring
Spill & Incident Response
Engineered Landfill Construction
Bioremediation Solutions

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- Bioremediation Solutions

- Tailings Management
- NORM Management
- Industrial Water Treatment

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Waste Classification, Tracking & Regulatory
Engineered Landfill Disposal
Waste Transportation
TRD
Onsite Waste Management
Specialized Waste Containers
Caverns & Oilfield Waste Management
NORM Management

Remediation & Reclamation
Demo & Decommissioning
Civil & Environmental Construction
Construction Drilling & Shoring
Spill & Incident Response
Engineered Landfill Construction
Bioremediation Solutions

Tailings Management
NORM Management
Industrial Water Treatment
With ~ 2.0 m b/d production comes a lot of waste

- **Leachate**
- **Solid Waste – Landfill & Hazardous & Non-Hazardous**
- **Produced Water**
- **Contaminated Soil**
- **Spill Waste**
- **Paint**
- **Used Lube Oil**
- **Aerosol Cans**
- **Plastic**
- **Grease**
- **Batteries**
- **Self Heating Solids – Iron Sulphides**
- **Slop Oil & Tank Bottoms**
- **Concrete**
- **Tires**
- **Cardboard**
- **Compost**
- **Drilling Mud**
- **Absorbents**
- **Oily Rags**
- **Flammable Liquids**
- **Florescent Light Tubes**
- **Amine Liquids**
- **Corrosive Liquids**
- **Concrete**
- **Tires**
- **Cardboard**
- **Compost**
- **Basal Water**

- **Catalyst**
- **Produced Water**
- **Sand Blast Grit**
- **Absorbents**
- **Glycol**
- **Scrap Metal**
- **Evaporator Blow Down Water**
- **Amine Liquids**
- **Oil Filters**
- **Production Filters**
- **Naturally Occurring Radioactive Material (NORM) Waste**
## STEP 1: DETAILED WASTE ASSESSMENT AUDIT

EVALUATION OF END DISPOSAL OPTIONS – ALL WASTE HAS IT’S PLACE

<table>
<thead>
<tr>
<th>Waste Stream Characterization &amp; Evaluation of Disposal Practices</th>
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<tbody>
<tr>
<td>Waste stream tier &amp; optimize = Maximized Returns</td>
</tr>
<tr>
<td>All waste, volumes &amp; Frequencies = Improvements</td>
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<tr>
<td>Waste consolidation = Reduce transportation</td>
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<tr>
<td>Waste diversion = Improve sustainability</td>
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</tbody>
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<tr>
<th>Identifying Waste Segregation Practices</th>
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<tr>
<td>Onsite personnel education = Reduce at source</td>
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<tr>
<td>Re-direction of waste streams</td>
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<tr>
<td>Right sized containers = Improve containment</td>
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<tr>
<td>Reuse containers = Carbon footprint reduction</td>
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<tr>
<th>Evaluating &amp; Documenting Waste Recyclables</th>
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<td>Improve recycling, recovery &amp; landfill diversion</td>
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<tr>
<td>Improve labelling &amp; manifesting = Efficiency</td>
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<th>Evaluation of End Disposal Options – All Waste Has It’s Place</th>
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<tbody>
<tr>
<td>Identifies precise &amp; most efficient disposal option</td>
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<tr>
<td>Network of disposal options (regional &amp; owned) = Reduce transportation, Improve liability</td>
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CHOOSING A PARTNER: KEY CONSIDERATIONS

Onsite Personnel & Partnership
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Containment
Drums, Bins, Containers
CHOOSING A PARTNER: KEY CONSIDERATIONS

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Incident Response
CHOOSING A PARTNER: KEY CONSIDERATIONS

- Onsite Personnel & Partnership
- Containment Drums, Bins, Containers
- Incident Response
- Facility Network Treatment & Disposal
CHOOSING A PARTNER: KEY CONSIDERATIONS

- Onsite Personnel & Partnership
- Containment Drums, Bins, Containers
- Regulatory & Compliance Waste Tracking & Reporting
- Incident Response
- Facility Network Treatment & Disposal
CHOOSING A PARTNER: KEY CONSIDERATIONS

Onsite Personnel & Partnership

Containment
Drums, Bins, Containers

Environment, Health & Safety Record

Incident Response

Regulatory & Compliance
Waste Tracking & Reporting

Facility Network
Treatment & Disposal

Waste Tracking & Reporting
CHOOSING A PARTNER: KEY CONSIDERATIONS

Waste Partnership: Integration improves efficiency

- Onsite Personnel & Partnership
- Environment, Health & Safety Record
- Containment Drums, Bins, Containers
- Regulatory & Compliance Waste Tracking & Reporting
- Incident Response
- Facility Network Treatment & Disposal
ONSITE RESOURCE MANAGEMENT MODEL

In-Depth Analysis of Project Scope

Optimize Processes, Improve Efficiencies

Roadmap Plan

Onsite Customized Training & Supervision

Onsite Efficiencies

Operational Efficiencies

Regulatory & Compliance – Waste Tracking & Reporting
**Customer Challenge:**
- Current waste management practices were divided across several contractors
- Required management across several oil sands facilities – Insitu & mining

**Customer Goal:**
- Pursuit of operational excellence and improved sustainability – Ensure best practices across the board

**Tervita Onsite Resource Management Model:**
In-depth analysis, roadmap and implementation of process improvements delivered:

- **Lime Sludge** – Improved safety in transportation practices
- **Leachate** – Tanker trucks to reduce transportation costs by ~60%
- **Treat waste direct at source**
- **Reduced ecopit fluid waste handling costs by ~50%**
Thank-you
We wish you well in your sustainability efforts

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