Current Situation and Challenges to Address on the Landfill of Tripoli

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Background Information

- Tripoli controlled dump is situated along the coastline
- North to the Port of Tripoli and adjacent to the Abou Ali River
- For over 20 years → 1997: boundary-less uncontrolled dumpsite
- In 1997: Seaside wall
- In 1999: Rehabilitation and Operation as a controlled dump
- Area: 60,000 m²
- About 300 tons/day in the UCF (2012)
- About 425 tons/day (2016) (Syrian Refugees)
- Height: > 37m
- Total amount of landfilled waste (2001 → 7/2017): 1,999,203 tons
Contract Information

- Contractor: BATCO (Badawi Azour Trading & Contracting)
- Client: Urban Community Al-Fayhaa’ (UCA), Council for Development & Reconstruction (CDR)
- Consultant: Dar Al Handasah Nazih Taleb & Partners (DAHNT)
Scope of Work at the Landfill

- Control of incoming wastes
- Proper waste placement and compaction
- Application of daily cover
- Biogas flaring and limited leachate control
Operation in the Landfill

Incoming MSW → Inspection → Receipt at Weighbridge → Landfilling

- Monitoring & Quality Control
- Daily flare Monitoring
- Leachate Control
- Reporting
Operation in the Landfill

- Spreading and compaction in layers of approximately 50cm
- Covering with at least 15cm of inert soil material
- Leachate Control is performed by constructing peripheral ditches by BATCO to drain the leachate into pits through pumping
- Leachate is extracted on daily basis:
  - Partially recirculated back into the landfill
  - Remaining leachate is conveyed to the LTP for treatment and disposal into a nearby open channel
- Daily Flare Monitoring: landfill gas collection system is not functioning properly since September 2012
Problems Facing the Dump

- Dump should be closed end of 2012 but unfortunately it is still receiving waste till now.

- Gas flaring can not work under current situation (increase in waste height, not closing the dump completely, need of additional well.

- Leachate treatment: didn’t work well, design capacity: 36m³/day
Current Situation of the Landfill

- Elevation of waste is +39m level in some parts of the landfill
- Already design is marked +29m
- Consequences:
  - Vertical Stress
  - Lateral Pressure on the peripheral Wall
  - Failure and collapse of the peripheral wall due to sliding of waste mass
Short-term Solution by the Contractor

- Maintaining a trench up to 4m deep around the inner face of the peripheral wall
- Extracting leachate through peripheral walls
- Re-grading the slopes
Mass Balance of Waste

425 t/d Sorting Plant

- 200 tons Compost
- 120 tons RDF
currently unable to make use of
- 6.4 tons Recyclables
  Low quantity due to scavengers in streets
- 98.6 tons Rejects directly to LF
  Total Landfilled Quantity: \textbf{238.6 tons/d}

- 80 tons Refined Compost
- 20 tons Compost Rejects
Physical Composition of Waste

The move from landfill-based to resource-based waste management systems requires a greater knowledge of the composition of municipal solid waste. Solid waste in Landfill is generally composed of three categories i.e.

- **Biodegradable** such as food waste, animal waste, leaves, grass, straws, and wood.
- **Non-biodegradable** are plastic, rubber, textile waste, metals, and
- **Recyclable material** includes paper, card board, plastic.
<table>
<thead>
<tr>
<th></th>
<th>(Percentage)</th>
<th>Composition</th>
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<td></td>
<td>(Lebanon)</td>
<td>(Cairo)</td>
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<td>مواد عضوية متخمرة (Organic Waste)</td>
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<td>55</td>
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<td>ورق (Paper)</td>
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<td>زجاج (Glass)</td>
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<tr>
<td>أخرى (Others)</td>
<td>14.9</td>
<td>-</td>
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Proposed Remedial Possibilities for Tripoli Waste Landfill

When selecting reclamation, it is necessary to take into account not only the ecological conditions, but also socio-economic conditions and conditions territorial technical. Proposed scenarios are the following:

1. Scenario 1: No change
2. Scenario 2: Reclamations with minimal change
3. Scenario 3: Reclamations with complete extracting
Challenges and Solutions

When selecting reclamation, it is necessary to take into account not only the ecological conditions, but also socio-economic conditions and conditions territorial technical. Proposed scenarios are the following:

- **Scenario 1:** Leave the dump as it is
- **Scenario 2:** Closure + Cover
- **Scenario 3:** Landfill mining and reclamation
Scenario 1: Leave Landfill as It Is

Nothing will change

Odor and pollution will remain for years ⇔ More failures in the Landfill
Scenario 2: Closure and Cover of Landfill

1. Collection, treatment and monitoring of leachate and gas for about 15 years
2. Maintenance of the gas collection and equipment
3. Monitoring and maintenance of the final covering and any other long-term remediation measures required and installed

VERY HIGH COST

Not benefiting from the urban land

Not Feasible
Cost for Final Closure and Remediation

- Tripoli Landfill is classified as Class 1 (Simple Case): < 3,000 m³, 20 EUR/ m³

- Currently, Tripoli landfill is about 2220 m³,

- Options for funding the cost of closure/remediation is limited since the costs will not bring any return or future financial benefits. Therefore the options of financing of these costs by the private sector, or through long-term loan from International Financing Institutions (European Investment Bank (EIB), European Bank for Reconstruction and Development (EBRD), World Bank (WB), etc.) are to be considered not feasible.
Scenario 3: Landfill Mining and Reclamation

Sustainable processing involves a series of mechanical processing operations designed to recover one or all of the following:

- **Recyclables**
  - Incombustible (metal, glass, dense plastic other than films)
  - Mobile sorting on the 30,000m² land near the landfill
  - WTM

- **Combustible**
  - (paper, textiles, rubber, wood, plastic films)
  - Send to incineration (WTE)

- **Organic Waste**
  - Turn into fresh compost and use as soil amendment (WTM)

- **Inert Soil Material**
  - Rehabilitation (WTM)

To Market
Landfill Reclamation

- Recovery of space
  - Reclaimed landfill volume for reuse of additional capacity at reduced cost
  - **Land value of site reclaimed for other purposes**

- Reduce landfill footprint
  - Minimizes long term environmental impact (surrounding and socio-environmentally areas)
  - Therefore reduction in costs of closure and post-closure
Summary of Advantages of Scenario 3

- Costs are often offset by the sale or use of recovered materials, such as recyclables, soil, and waste, which can be burned as fuel
- Reduction in closure cost
- Releases of landfill odor and gas are reduced
- Benefit from the urban economic area especially it has high land cost, adjacent to the Tripoli Special Economic Zone, and close to the port
- Create new job opportunities
Steps in Project Planning

The following is the approach to be followed:

1. Conduct a site characterization study
2. Assess potential economic benefits
3. Invest regulatory requirements
4. Establish preliminary worker health and safety plan
5. Assess project costs

Note: short-term action is required for tackling operational issues in Landfill!!!
Tools and Machinery

- Excavators
- Moving floor and elevator conveyor belts
- A coarse rotating trommel screen
- A fine rotating trommel screen
- A magnet
- Front end loader
- Odor control sprayer
First Studied Step of Scenario 3:

**Target:** Determine the nature and composition of the fill, down to depth below current elevation

Proposed number of boreholes: 10
(1/6,000m²)

Cost: $16,850
Study needs fund to be continued

Any HELP?
Thank You