Project Overview System Type: Trona Soda Ash Thickener Underflow Dewatering System

Location: Salt Lake City, Utah

Material: Trona soda ash tailings (dense mineral slurry)

Flow Rate: 10,000 GPM slurry

Dry Solids Throughput: 1,965 TPH

Estimated Slurry Specific Gravity: 1.428

Estimated Moisture Content (by weight): 45%

Estimated Solids Content (by weight): 55%

System Flow Description Inlet Stage:

- Feed: Thickener underflow slurry @ 10,000 GPM
- Dry Solids Feed: 1,965 TPH
- Routed to 3 x 2.4 million gallon carbon steel storage tanks with agitators (12 hr total retention)

Storage & Mixing:

- 3 tanks (80 ft diameter x 65 ft height)
- Agitators: 2–3 per tank; estimated 2,000–3,000 HP/tank

Filter Press Stage:

- Slurry pumped from tanks to filter presses via high-pressure pumps
- Filter Press Output: 85% solids cake
- Clear filtrate returned to process water tanks
- Filter Press Quantity: 13 units (each ~1500 m^2 area)
- Compressed Air System: Integrated for cake drying

Cake Discharge and Conveying:

- Filter cake (2,311.9 TPH) to 48-inch belt conveyor
- Conveyor equipped with rip detectors, misalignment switches, pull cords

Instrumentation and Controls:

- Tanks, pumps, and conveyor fitted with standard level, pressure, and flow instrumentation

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System Calculations & Equipment Estimates

1. **Slurry Properties**
    - Slurry Density: 11.91 lb/gal
    - Total Slurry Flow: 3,573 TPH
    - Dry Solids: 1,965 TPH
2. **Storage Tank Sizing**
    - Volume: 7.2 million gallons total
    - Each tank: ~2.4 million gallons (~320,832 ft^3)
3. **Agitator Sizing**
    - Estimated 2,000–3,000 HP per tank
4. **Filter Press Sizing**
    - Dry solids: 1,965,150 kg/hr
    - Filtration Rate: 100 kg/m^2/hr
    - Total Filter Area: 19,651.5 m^2 → 13 filter presses
5. **Belt Conveyor Sizing**
    - Total Cake Flow: 2,311.9 TPH @ 85 lb/ft^3
    - Required Conveyor Volume: ~906.6 ft^3/min
    - Belt Width: 48"
    - Estimated Motor HP: 1000–1200 HP
6. **Pump Sizing (Filter Press Feed)**
    - Flow: 10,000 GPM
    - TDH: ~600 ft (adjusted for SG)
    - Hydraulic HP: ~2,164 HP
    - Motor HP (with efficiency): ~4,007 HP
    - Selection: 2 x 2500 HP or 3 x 1500 HP (1 standby)

Installation and Infrastructure Requirements

Component	Estimate / Note
Storage Tanks	3 x 2.4M gal, carbon steel
Agitators	2–3 per tank, ~2,500 HP total per tank
Filter Press System	13 units, compressed air system included
Conveyor System	48" belt, instrumentation included
Pumps	Slurry pumps to press, ~4,000 HP each

Instrumentation	Level, pressure, flow switches across system

Preliminary Total Installed Cost Estimate

Cost Item	Estimated Cost ($)
Storage Tanks (3)	$6,000,000
Agitators	$2,250,000
Filter Press System (13)	$22,000,000
Belt Conveyor (48")	$1,500,000
Pumps (to filter press)	$750,000
Instrumentation	$750,000
Major Equipment Total (ME)	**$33,250,000**
Lang Factor (x4.0)	
Total Installed Cost (TIC)	**$133,000,000**

Conclusion & Recommendations The system is high-capacity and designed for continuous dewatering of dense, abrasive slurry.

Key recommendations:

- Confirm PSD, cycle time, and vendor input for filter press sizing
- Validate agitator power through CFD or vendor input
- Obtain detailed pump curves for filter press pressure requirements
- Optimize belt layout and select standard accessories
- Include comprehensive instrumentation and safety controls