



# KASSANE GOLD MINE

## Sodium Cyanide Transport

### Risk Analysis & Cost Optimization

*Route: Accra (Ghana) > Ouagadougou > Kaya > Dori > Kassane Mine (Burkina Faso)*

56 trucks/month | 14-truck armed convoys | Insurgent-active corridor

Prepared: February 2026 | Confidential

# TRANSPORT ROUTE OVERVIEW



## LOGISTICS PARAMETERS

Monthly volume: **56 trucks**  
Convoy size: **14 trucks / week**  
Convoy frequency: **4 convoys/month**  
Round trip duration: **up to 60 days**  
Army escort: **Kaya to Mine**  
Commodity: **Sodium Cyanide (hazmat)**

## CRITICAL CONSTRAINTS

Ouagadougou: **Night transit ban for hazmat**  
Kaya wait: **Up to 14 days for army convoy**  
Dori wait: **Up to 7 days staging**  
Security threat: **Frequent insurgent attacks**  
Free waiting: **Only 2 days per truck**  
Waiting cost: **\$200/day/truck (after free days)**



# WAITING COST CALCULATION — METHODOLOGY

**Step-by-step cost buildup for each truck (worst-case scenario):**

## **STEP 1 — Maximum waiting days per trip**

Kaya wait (army convoy): up to 14 days + Dori wait (staging): up to 7 days = 21 total waiting days

## **STEP 2 — Deduct free waiting days**

Trucking companies provide 2 free waiting days per trip (included in the freight rate).

**Billable waiting days per truck per trip:  $21 - 2 = 19$  days**

## **STEP 3 — Cost per truck per trip**

**$19 \text{ billable days} \times \$200/\text{day} = \$3,800 \text{ per truck per trip}$**

## **STEP 4 — What does \$200/day cover?**

Driver meals & accommodation | Satellite phone usage (convoy leaders) | Private security guards

*NOTE: No additional fees during transit legs (Accra > Paga > Ouaga > Kaya, and Dori > Mine).*

# \$ MONTHLY & ANNUAL COST IMPACT

PER TRUCK  
PER TRIP

**\$3,800**

19 days x \$200/day

MONTHLY  
(56 TRUCKS)

**\$212,800**

56 trucks x \$3,800

ANNUAL  
(12 MONTHS)

**\$2.55M**

\$212,800 x 12 months

## SCENARIO ANALYSIS — IMPACT OF WAITING DURATION

| Scenario   | Kaya Wait | Dori Wait | Total Wait | Billable Days | Cost/Truck | Monthly (56) | Annual      |
|------------|-----------|-----------|------------|---------------|------------|--------------|-------------|
| Best Case  | 3 days    | 1 day     | 4 days     | 2             | \$400      | \$22,400     | \$268,800   |
| Moderate   | 7 days    | 3 days    | 10 days    | 8             | \$1,600    | \$89,600     | \$1,075,200 |
| Likely     | 10 days   | 5 days    | 15 days    | 13            | \$2,600    | \$145,600    | \$1,747,200 |
| Worst Case | 14 days   | 7 days    | 21 days    | 19            | \$3,800    | \$212,800    | \$2,553,600 |

# RISK REGISTER — SECURITY & OPERATIONAL

| ID | Risk   | Likelihood | Impact   | Rating  | Consequence  |
|----|--|------------|----------|---------|--|
| R1 | Insurgent ambush on Kaya-Dori-Mine corridor          | High       | Critical | EXTREME | Loss of life, cargo theft, route closure, environmental spill of NaCN            |
| R2 | Extended army convoy delays (>14 days)               | Medium     | High     | HIGH    | Demurrage costs escalate, NaCN supply disruption to mine, production halt        |
| R3 | NaCN spill or leak during attack or accident         | Medium     | Critical | EXTREME | Environmental contamination, fatalities, regulatory shutdown, community backlash |
| R4 | Road deterioration / impassable route (rainy season) | Medium     | High     | HIGH    | Multi-week delays, truck damage, additional costs, stranded cargo                |
| R5 | Border delays at Paga (customs, paperwork)           | Medium     | Medium   | MEDIUM  | 1-3 day delays per crossing, cascading convoy scheduling issues                  |
| R6 | Driver fatigue / accident (60-day round trip)        | Medium     | High     | HIGH    | Injuries, NaCN spill, truck loss, insurance claims, replacement costs            |



# RISK REGISTER — FINANCIAL & SUPPLY CHAIN

| ID  | Risk   | Likelihood | Impact   | Rating  | Consequence   |
|-----|--|------------|----------|---------|---|
| R7  | Demurrage cost overruns (>\$2.5M/yr)         | High       | High     | HIGH    | Budget blow-out, reduced mine profitability, pressure on AISC           |
| R8  | Trucking company refuses/abandons route      | Medium     | Critical | EXTREME | Complete supply chain failure, no alternative carrier, production stops |
| R9  | Fuel price spikes or scarcity on route       | Medium     | Medium   | MEDIUM  | Higher freight rates, stranded trucks, renegotiation of contracts       |
| R10 | Political instability / coup / route closure | Medium     | Critical | EXTREME | Indefinite supply disruption, asset stranding, force majeure            |
| R11 | NaCN regulatory ban or restriction change    | Low        | High     | MEDIUM  | Need for alternative reagent or new permits, supply gap                 |
| R12 | Community blockade at mine or en route       | Medium     | Medium   | MEDIUM  | Convoy held up, negotiation delays, reputational damage                 |



# RISK HEAT MAP





# MITIGATION MEASURES — COST REDUCTION

## NEGOTIATE DEMURRAGE TERMS

- Increase free days from 2 to 5 per trip in contract renegotiation
- Savings: 3 extra free days x \$200 x 56 trucks = \$33,600/mo (\$403,200/yr)
- Negotiate tiered rates: \$150/day after day 5, \$200 after day 10
- Include demurrage cap clause (max billable days per trip)
- Bundle annual volume commitment for better rates

## OPTIMIZE CONVOY SCHEDULING

- Coordinate with army to establish fixed weekly convoy schedule from Kaya
- Target: reduce Kaya wait from 14 to 5-7 days average
- Pre-position trucks at Kaya to match army departure dates
- Establish direct liaison officer with military command
- Share convoy costs with other mines on the same route

## BUILD STRATEGIC NaCN BUFFER

- Maintain 45-60 day NaCN inventory at mine site
- Decouple mine operations from transport disruptions
- Send fewer but larger convoys (reduce frequency risk)
- Explore pre-positioning NaCN at Dori staging area
- Reduces urgency premium and emergency shipment costs





# MITIGATION MEASURES — SECURITY & OPERATIONS

## ENHANCED SECURITY FRAMEWORK

- GPS tracking on all trucks with real-time monitoring center
- Armored lead/tail vehicles with trained response teams
- Route intelligence sharing with MINUSMA/G5 Sahel forces
- Decoy convoy tactics and variable departure schedules
- Emergency response plan with medevac capability
- Community engagement along route (early warning network)

## ALTERNATIVE ROUTE PLANNING

- Map secondary route via Togo-Burkina corridor as backup
- Assess rail feasibility Accra to Ouagadougou (future)
- Explore air charter for emergency NaCN resupply
- Pre-negotiate permits for Ivory Coast transit route
- Seasonal route switching to avoid worst road conditions
- Establish mutual aid agreements with neighboring mines

## OPERATIONAL EXCELLENCE

- Driver rotation program — max 30 days per driver per trip cycle
- Mandatory rest stops and fatigue monitoring technology
- Spill containment kits and NaCN emergency training for all drivers
- Preventive truck maintenance at Kaya (use wait time productively)
- Digital convoy management platform (ETA tracking, status updates)
- Insurance review: adequate coverage for NaCN hazmat transport

# \$ POTENTIAL SAVINGS — MITIGATION IMPACT

## CURRENT STATE (Worst Case)

Billable days/truck: **19 days**  
Monthly cost: **\$212,800**  
Annual cost: **\$2,553,600**

## TARGET STATE (With Mitigations)

Billable days/truck: **5 days (from ~8 wait, minus 3 extra free)**  
Monthly cost: **\$56,000**  
Annual cost: **\$672,000**

**POTENTIAL ANNUAL SAVINGS:**  
**\$1,881,600 (74% reduction)**

*Savings breakdown: Convoy optimization (~\$1.0M) + Extra free days (~\$400K) + Tiered rate negotiation (~\$480K)*



# RECOMMENDATIONS & NEXT STEPS

## IMMEDIATE ACTIONS (0-3 Months)

1. Renegotiate demurrage terms: target 5 free days and tiered daily rates.
2. Establish dedicated military liaison for fixed weekly convoy schedules from Kaya.
3. Install GPS/satellite tracking on all 56 trucks and build a monitoring dashboard.

## SHORT-TERM (3-6 Months)

4. Build strategic NaCN buffer (45-60 days) at mine to absorb disruptions.
5. Develop alternative route contingency plan through Togo-Burkina corridor.
6. Implement driver rotation and fatigue management program.

## MEDIUM-TERM (6-12 Months)

7. Evaluate consortium convoy model with neighboring mines to share costs.
8. Conduct full tender for transport services — leverage \$2.5M+ spend for competitive bids.
9. Assess rail/intermodal options for long-term cost structure improvement.