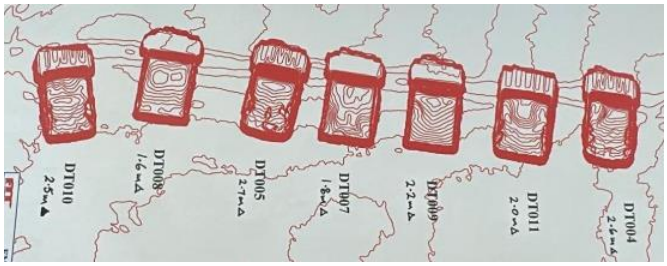
ECORA Solutions

Case 27: Eliminating Carryback and Improving Load Efficiency in Overburden Operations – WA Goldfields

ECORA Trial
Truck: CAT-777
Commodity: Gold
Location: Kalgoorlie/ WA

1. Operational Context; During the initial overburden and waste rock phase of a Western Australian open pit operation operating under dry, high-temperature Goldfields conditions, the site experienced significant material carryback on haul truck trays and excavator buckets. Despite the hot climate, the material retained enough inherent moisture to adhere aggressively to steel surfaces. Average carryback ranged **10% per load**, with peaks of up to **50%**, resulting in reduced payload efficiency, repeated manual scraping, and operational downtime. Excavators were also impacted, requiring approximately **13 bucket passes to fill a single CAT-777 truck**, materially constraining production.

1	**Fleet size**	10 CAT 777 trucks (100 tonnes and 63,5m^3)
2	**Material**	Overburden/ waste rock/ mullock -
3	**Pain points**	10% to 50% carryback on trucks and 40% on excavators
4	**Mine routine**	5 days/ week – shift from 7 AM to 5PM



Results Trucks:

- **100% payload discharge on every cycle (**during 7 days with daily application**)**
- **Zero carryback through entire shifts (~45 loads/day)**
- No need for cleaning for 7 days
- Stable unloading times (operator factor)

Results – Excavators:

- **+15% productivity - Trucks achieved 45+ loads per shift (vs. prior 35–40)**
- Travel **cycle time improved** due to faster loading
- No excessive bucket buildup observed with daily application

TRIAL EXECUTION

SOLUTION: ECORA TRIAL

A structured **7-day controlled field trial** was conducted on 2 CAT-777 haul trucks and hydraulic excavators operating in overburden conditions.

1. Planning	2. Set Up	Execution	Final Report
1. Agree and Schedule and Requirements	2. Confirm location and equipment details	3. Approvals, Set Up & Baseline	4. Protocol Execution & Data collection	5. Conclusion Report and Business Case
	1 day	1 day	7 days	3 days

2. Application Protocol

•Day 0: Three initial saturation coats

•Day 1 onwards: One daily morning application and Continuous inspection of: Carryback volume, Unloading performance, Travel time between cycles, Loading efficiency (buckets per truck)

Application Protocol

Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
- Cleaned trucks - #5 and 8 - Apply on trucks # 8 and 5 – Saturation (3 coats) - 30 min per truck	- Safety and compliance check and start trial - Data collection	- Apply 1 coat on each truck - # 8 and # 5 - 10 minutes per truck - Apply coat on truck #8 (2PM) - Conclusion: #8 not comparable, switch to #9 - Clean trucks # 9 and 7	- Apply 1 coat on each truck - # 9 and # 5 - 10 minutes per truck	- Apply 1 coat on each truck - # 9 and # 5 - 10 minutes per truck - Apply 1 coat on excavator (without cleaning)	- Apply 1 coat on each truck - # 9 and # 5 - 10 minutes per truck - Clean excavator and apply 1 coat	- Apply 1 coat on each truck - # 9 and # 5 - 10 minutes per truck - Apply 1 coat on excavator	- Apply 1 coat on each truck - # 9 and # 5 - 10 minutes per truck - Trial closure

Truck #8

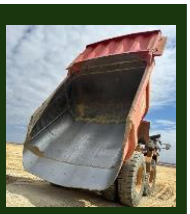
Truck #9

Truck #5

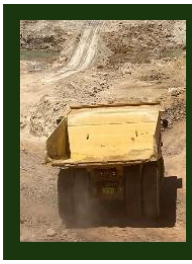
Application procedure

TRIAL EXECUTION

CAT-777 - Round Tray

	Day 1	Day 2	Day 3	Day 4	Day 5
With ECORA Truck #5					
Baseline Truck # 4,10,11					

CAT-777 - Square Tray

	Day 1	Day 2	Day 3	Day 4	Day 5
With ECORA Truck #9	N/A	N/A			
Baseline Truck # 7	N/A	N/A			

3. Key Findings – Haul Trucks

- **100% payload discharge on every cycle**
- **Zero carryback through entire shifts (~45 loads/day)**
- No need for cleaning for 7 days
- Stable unloading times (operator factor)

Note:

- Surface integrity is critical
- Anchor points prevent coating penetration
- Damaged trays require:
  - Double daily application initially, or
  - Mechanical refurbishment (smoothing)

In contrast, untreated sister trucks:

- Developed carryback from the first few loads
- Reached maximum buildup between the 3rd and 5th load
- Carried dead weight for **34–40+ trips per shift**
- Required scraping downtime of **30–45 min per event**
- Failed to discharge full payload on every trip

Result:

Complete elimination of carryback where tray conditions met minimum smoothness criteria.

TRIAL EXECUTION

Excavator

Day 4, 5, 6 and 7

Baseline

With ECORA

4. Key Findings – Excavators

Excavator buckets were experiencing significant material adhesion, with:

- Up to **50% blockage observed**
- Approximately **13 bucket passes required to fill one truck**

After treatment:

- Bucket passes reduced from **13 to 6–8**
- Loading efficiency improved by approximately **50–100%**
- Material buildup dramatically reduced
- Increased number of truck cycles per shift

Once both excavators were treated:

- Trucks achieved **45+ loads per shift** (vs. prior 35–40)
- Travel cycle time improved due to faster loading
- No excessive bucket buildup observed with daily application

Summary:

- 50% Reduction in the Loading Time: from 13 to 6 buckets to fill a truck.
- 40-60% Increase in the Number of Trips: from 35-40 to 45-52 (regarding excavator efficiency only)
- 5% Increase in the Number of Trips: 12-15 (regarding cleaning time saved only)
- 50-60% Increase in the Volume Carried throughout the day (from carryback saved, and increase in the number of trips – Excavators' efficiency + Cleaning Time)
- 46% Reduction in Cost, on the total operation (considering the cost to mine 1 BCM, and the total volume handled from the additional volume, as stated above).

TRIAL RESULTS

5. Quantified Operational Improvements

Based on recorded data and operational extrapolation:

Performance Metric	Before	After	Improvement
Buckets to fill truck	13	6–8	~50% reduction
Trips per shift	35–40	45–52	40–60% increase
Cleaning downtime	30–45 min events	Eliminated	100% reduction
Payload loss (carryback)	5–30%	~0% (compliant trays)	Full recovery
Daily material movement	Baseline	+50–60%	Significant uplift
Estimated total operational cost per BCM	Baseline	–46%	Major cost efficiency

6. Operational Impacts

Production
- Increased material moved per day
- Higher truck utilisation
- Reduced bottleneck at loading stage

Maintenance
- Elimination of scraping-related downtime
- Reduced tray impact damage
- Less mechanical stress on equipment

Safety
- Reduced manual cleaning exposure
- Fewer maintenance interventions during shifts

Financial
- Recovery of lost payload (5–30%)
- Increased trip frequency
- Reduction in cost per BCM
- Estimated **46% reduction in total operational cost per unit volume**

7. Technical Observations

- Performance peaks around Week 4 of continuous application
- Daily application is recommended
- Surface preparation significantly enhances results
- Excavator treatment creates compounding system-wide productivity gains

8. Conclusion

This controlled 7-day field study confirmed that, under high-temperature Goldfields overburden conditions:

- Carryback is a major hidden productivity loss, even in dry climates.
- When tray conditions meet minimum surface integrity requirements, carryback can be eliminated entirely.
- Excavator treatment alone can transform overall mine cycle efficiency.
- System-wide integration produces compounded operational gains.
- The greatest uplift occurs when both trucks and excavators are treated concurrently.

The case demonstrates that material adhesion control is not merely a maintenance improvement — it is a production multiplier.