

CHALLENGE

Eliminated **\$1.7M/yr** in losses from misdiagnosed “calcium phosphate” deposition at a food additive plant

A food-additive producer rated for 10,000 metric tons/yr was losing throughput, revenue, and profitability to deposition across multiple heat exchangers. The incumbent supplier identified the deposit as calcium phosphate and adjusted the program accordingly — with no effect — and the account was at risk. An independent, first-principles investigation found the true mechanism, corrected the program with no capital, and restored 100% of production.

RECOVERED PRODUCTION MARGIN	CLEANING COST AVOIDED	TREATMENT COST REDUCTION	TOTAL ANNUAL VALUE
\$1.47M	\$115K	\$78K	\$1.7M

CHALLENGE

What was happening

Deposition across multiple heat exchangers was driving:

- Lost production from throughput cuts, with plant-shutdown risk
- Repeated online and offline exchanger cleanings
- Polymer overfed to ~175% of target — enough to foam during feed
- An account at risk of loss after failed corrections

The incumbent had reduced orthophosphate and raised dispersant based on the deposit ID, with no improvement.

INTERVENTION

What we did

Reconciled the actual chemical feed against the actives that should exist — predicting residuals from feed rates rather than trusting setpoints. Audited setpoints, reporting, and control logic with onsite personnel interviews. Profiled and borescoped the worst exchangers with historical recreation. Applied a competing-salt saturation model resolving up to **100 salts**, then redesigned the program — no capital required.

ROOT CAUSE

Orthophosphate was in control and HEDP read fine by wet test — but far more HEDP was being **fed** than the residual showed. Iron and manganese consumed part of it, and in the hottest exchangers the overfed HEDP **formed a direct calcium-HEDP salt** that deposited. On a routine deposit analysis it reports as calcium phosphate — which is why every phosphate-based fix failed.

RESULTS DELIVERED

Eliminated the deposition mechanism

Restored 100% throughput (~1,200 MT/yr)

Reduced treatment cost & foaming

Retired the supplier-switch risk

~26x return · payback under one month

It doesn't matter whether it's a refinery, a food plant, a hospital, or a power generator — knowing where to look and how to solve the problem is 25+ years of transferable experience that AI cannot replace. A deposit ID told one story; the chemistry told the truth. Your critical system deserves an independent review.