Condensate Contamination Share from a Tracer (Conductivity, Sodium)

Share of contaminant (juice, cooling water, process liquor) in returned condensate from a tracer such as conductivity or sodium, and the contaminant flow.

Method: Two-component tracer mass balance

Input parameters

Unit system: SI

Parameter	Value	Unit
Tracer in clean condensate Any tracer in consistent units: µS/cm, ppb Na, ppm TOC.	2.0000	
Tracer in the contaminant	4,000.0	
Tracer in the mixed condensate	12.000	
Condensate returned	50.000	t/h

Calculated results

Parameter	Value	Unit
Contaminant share of the condensate	2,501.3	ppm
Contaminant flow	125.06	kg/h

Notes for this case

- If the tracer is conductivity: it also responds to CO_2 and amines, so cation conductivity, sodium or TOC is sharper.

Formula and method

$$f = \frac{\kappa_m - \kappa_c}{\kappa_x - \kappa_c}, \quad \dot{m}_x = f\,\dot{m}$$

Variables

κ_c	Tracer in clean condensate	-
κ_x	Tracer in the contaminant	-
κ_m	Tracer in the mixed condensate	-
$\dot{m}$	Condensate returned	kg/s
f	Contaminant share of the condensate	-
$\dot{m}_x$	Contaminant flow	kg/s

Method and standards

Tracer balance.

Assumptions and limits

- Linear mixing of the tracer. Sodium and TOC mix linearly by mass; conductivity is only approximately additive and depends on temperature, so use temperature-compensated readings and treat the share as an estimate.
- The mixed reading must lie between the clean and contaminant readings; otherwise the inputs are rejected.

References

- Two-component tracer mass balance

Report details

Report reference	FCC-YHHE-RVYM (the same inputs always give the same reference)
Generated	17 November 2026, 19:50 UTC
Calculator	Condensate Contamination Share from a Tracer (Conductivity, Sodium)
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/boilers-power-plant/water-treatment/condensate-contamination-fraction

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.