

Tracer Tests for Verification of Boiler Water Circulation



Background

Boilers are complex constructions sensitive to corrosion attacks and decomposition. Modern boiler designs require efficient circulation of boiler water in all parts. Insufficient circulation of chemicals with boiler water may lead to:

- Corrosion in tube systems
- Risky and unsafe conditions
- Time-consuming breakdowns
- Expensive repairs.

Description

Isotope Tracer Tests are non-destructive technologies that can be carried out without disturbance of plant operation. Isotope tracers are used to verify design conditions and computational predictions because these tests disclose the real boiler water circulation pattern. The tracer method offered by FORCE Technology provides:

- Test of flow direction and flow velocity in downcomers
- Measurement of circulation time to establish equilibrium concentration of dissolved chemicals
- Test for local accumulation of boiler water chemicals.

Customer advantages

The information provided by Isotope Tracer Tests can be used to prevent:

- Local formation of deposits and overheating
- Corrosion
- Expensive repairs
- Minimize down time.

This information's can also lead to:

- Optimized plant design
- Optimized plant operation
- Improved personnel safety conditions.

Tracer Application

FORCE Technology is using short-lived radioactive tracers to measure flow velocities and examine circulation of boiler water chemicals.

A network of radiation detectors mounted outside on the boiler construction maps flow and circulation characteristics. FORCE Technology is licensed to perform such measurements on the basis of approved safety procedures.



Detectors mounted outside insulation panels

Method

Flow velocity in downcomers is measured by detecting the transit-time of small isotope tracer pulses injected instantaneously into the downcomer tube. Radiation detectors mounted at different positions outside the downcomer record the movement of the tracer pulses.

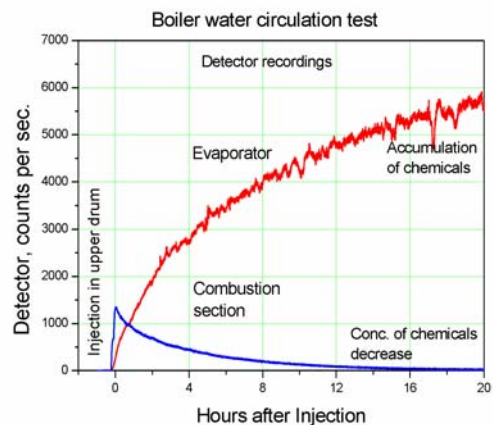
A single injection of a small volume of tracer is used to determine circulation pattern of boiler water chemicals. The gradual build-up of an equilibrium concentration of tracer in the different boiler sections is monitored as time series recorded by a network of detectors. Accumulation of chemicals in local sections of the boiler will be disclosed by these measurements.

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Measuring station where detector cables are connected to recording instrumentation. Detector recordings are displayed online.



Graphic plot of detector recordings from 2 different locations on the boiler. These measurements show that boiler water chemicals continuously are accumulated in the evaporator section during the examined load situation

Consultancy services

FORCE Technology has many years of experience in examination of boiler condition.

FORCE Technology combine unique experience in:

- Boiler water circulation testing
- Inspection and NDE
- Corrosion and metallurgy
- Failure analysis
- Design stress analysis
- Systematic maintenance
- Boiler and plant design.



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