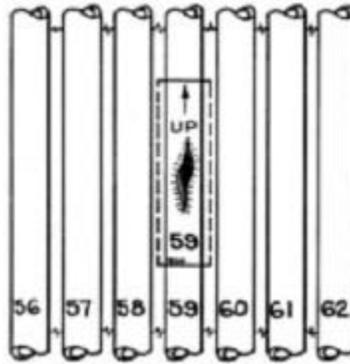


## Guidelines for Removing & Handling Tube Samples

It sometimes becomes necessary to remove a tube sample from the boiler for metallurgical analysis. Certain procedures should be followed to ensure that the tube is removed intact and that the information necessary for accurate analysis is communicated.

When removing a sample, perform the following:

- **Important! Do not cut through a failure.**
- The sample section shall be at least 3' for accurate analysis (for a failure, remove a section that includes at least 1' above and 1' below the failure site).
- **Remove the tube via a grinding/flapper wheel** so as to minimize the sample's exposure to excessive temperature and contamination (as such, avoid torch-cutting the sample).
- After removing, **seal any openings with duct tape** to avoid contamination.
- *Call in for suggestions on removing non-boiler tube samples.*



Next, mark the tube sample as follows (see example photo on the right): →

- ✓ Identify **orientation** (i.e. use "T" for top, "B" for bottom, "L" for left, etc.)
- ✓ Identify **hot and cold sides**, if applicable.
- ✓ Identify **coolant flow direction**.
- ✓ Identify **assembly and tube number**, if applicable.
- ✓ For a failure, identify the **area of interest** (if it is not obvious).

Finally, pack and ship the sample:

- Pack the sample in a shipping container (wooden box is preferable) with plenty of packing material to insure safe transportation.
- Fill out the [sample submittal form](#), include the tracking number and upload any documents, pictures and diagrams relevant to the tube sample.
- Ship sample(s) to the following address:

Laboratory  
2681 Coral Ridge Road  
Brooks, KY 40109-5207



## *Quick Tips on ID Deposits*

- A boiler becomes dirtier as operating time increases, thereby increasing the probability of tube failure caused by deposit build-up.
- Tube samples and deposit analysis after a failure occurs serve only to confirm that the boiler is dirty and deposits promoted the failure. Forced outages caused by this failure mechanism can be avoided by establishing a planned sampling & analysis program for waterwall tubing.
- The basic purpose of such a program is to monitor the boiler cleanliness. Periodically, all factors influencing boiler cleanliness are reviewed to determine the quantity of internal deposits and predict when chemical cleaning should be conducted.
- Tube samples are generally taken from the waterwalls at a location approximately 10' above the uppermost elevation of fuel nozzles. Historically, this location has been an area of potentially high deposition. It is recommended that **at least one tube section** is sampled **from each waterwall** for analysis. In addition, it is also beneficial to remove a **sample from the upper slope**.
- Thick deposits can lead to increased tube-metal temperatures, as the thermal conductivity of the deposit is less than that of the steel. With an insulating layer on the inside of the tube, the net effect is to raise tube-metal temperatures. Increase in tube-metal temperature will promote under-deposit corrosion.



Examples of Under-Deposit Corrosion