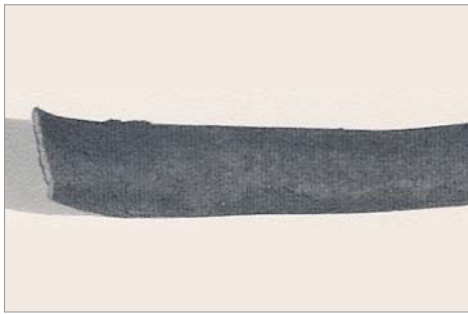




# How to Diagnose Premature Failures

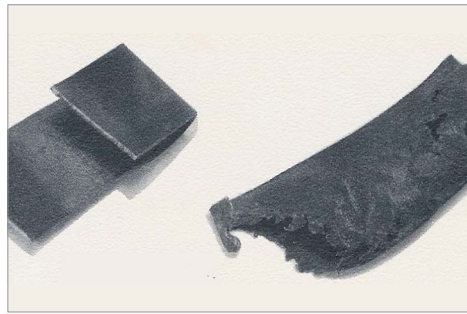
Assuming good furnace construction and use of proper heating element material, premature burn-outs are rare. Use these photos as reference to diagnose common failures.

## IDENTIFY FAILURES



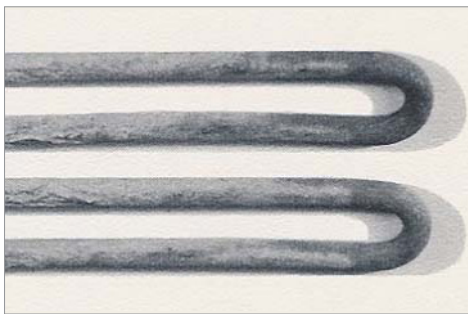
### “GREEN ROT” CORROSION

**Symptoms:** Green “warty” surface. Strongly magnetic. Very brittle. Will break if bent and fracture will show heavy green oxide scale extending below surface.



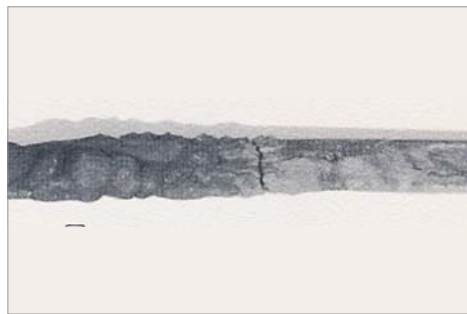
### CARBURIZATION

**Symptoms:** Black, dirty surface. Loss of ductility and heat resistance. Internal melting in advanced stages.



### OVERHEATING OF ELEMENTS

**Symptoms:** Rough and wrinkled surface. Loss of ductility and deformation of cross-section. Sag caused by internal melting.



### SULFUR ATTACK

**Symptoms:** Extremely “warty” surface, often silvery in color. Strongly magnetic. Extremely brittle.

## REPORT FAILURES

Most elements failures can be attributed to improper use of the equipment or improper control of its operation. National Element can perform a metallurgical analysis on any element if desired. Please submit sample of melted element sections.

In the event you need to report problems, please be ready to provide the following information:

### GENERAL INFORMATION

- Type of Furnace
- Furnace Process
- Element Material
- Size of Material

### SPECIFIC INFORMATION REQUIRED

- Furnace Atmosphere
- Chamber Temperature
- Element Temperature
- Thermocouple Locations
- Location of Elements
- Age of Element
- Past History
- Other related factors including insulation conditions, external contaminants, & Refractory Materials.