



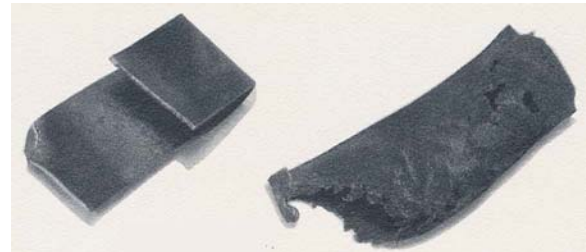
## How to Diagnose PREMATURE FAILURES

Assuming good furnace construction and use of proper heating element material, most premature burn-outs can be attributed to **IMPROPER USE OF THE EQUIPMENT - OR IMPROPER CONTROL OF ITS OPERATION**. These enlarged photos should be helpful in "on the spot" diagnosis on common 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

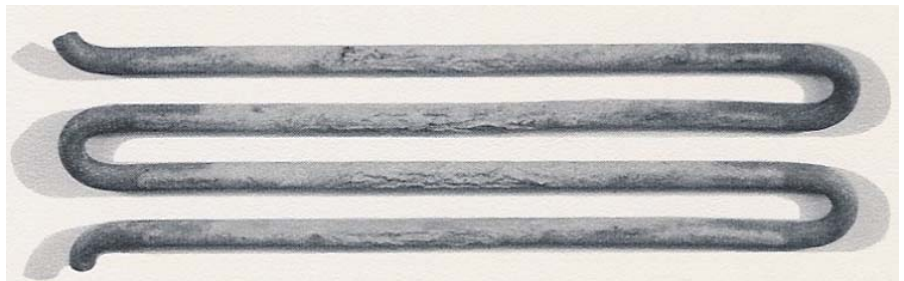
Symptoms: Black, dirty surface. Loss of ductility and heat resistance. Internal melting in advanced stages.



**Sulfur Attack** Symptoms: Extremely "warty" surface - often silvery in color. Strongly magnetic. Extremely brittle

### Overheating of Elements

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



## CHECK LIST FOR REPORTING FIELD SERVICE PROBLEMS

### General Information

1. Customer Name
2. Type of Furnace
3. Furnace Process
4. Element Material
5. Size of Material
6. Miscellaneous

### Specific Information Required

- |                         |                            |
|-------------------------|----------------------------|
| 1. Furnace Atmosphere   | 7. Refractory Materials    |
| 2. Chamber Temperature  | 8. Insulation Conditions   |
| 3. Element Temperature  | 9. External Contaminants   |
| 4. Location of Elements | 10. Thermocouple Locations |
| 5. Element Service Life | 11. Control Equipment Used |
| 6. Past History         | 12. Work Material Charged  |

Metallurgical Analysis can be performed; Always submit samples of melted element sections with above required information