ZINC WHISKERS

WHAT NOBODY'S TELLING YOU

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TC215 WG3: Facilities and Infrastructures for Data Centres

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TC93: Internal Networks of Electronic Communications for Houses and Buildings

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ZINC WHISKERS

THE PROBLEM

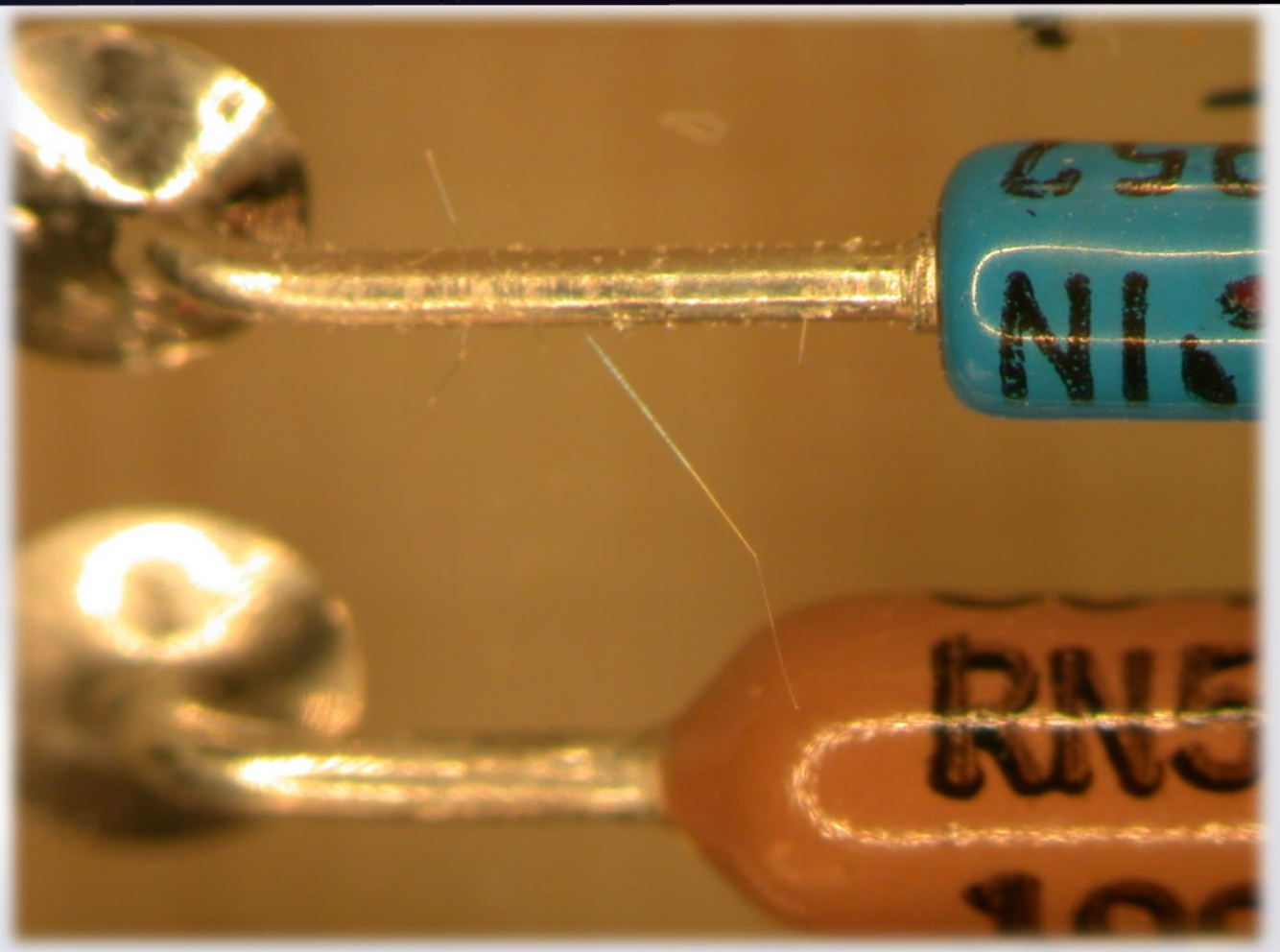
a. Are you having unexplained hardware failures – particularly disks drives and power supplies?

b. Are you having unexplained data corruption problems?

c. Do your problems get more frequent or severe after you move equipment or work in the access floor?

d. Have you installed the lightning fast server or CPU only to find it doesn't seem as reliable as your old legacy systems?

If you answered **YES** to any of the foregoing questions, you might have **ZINC WHISKERS**!

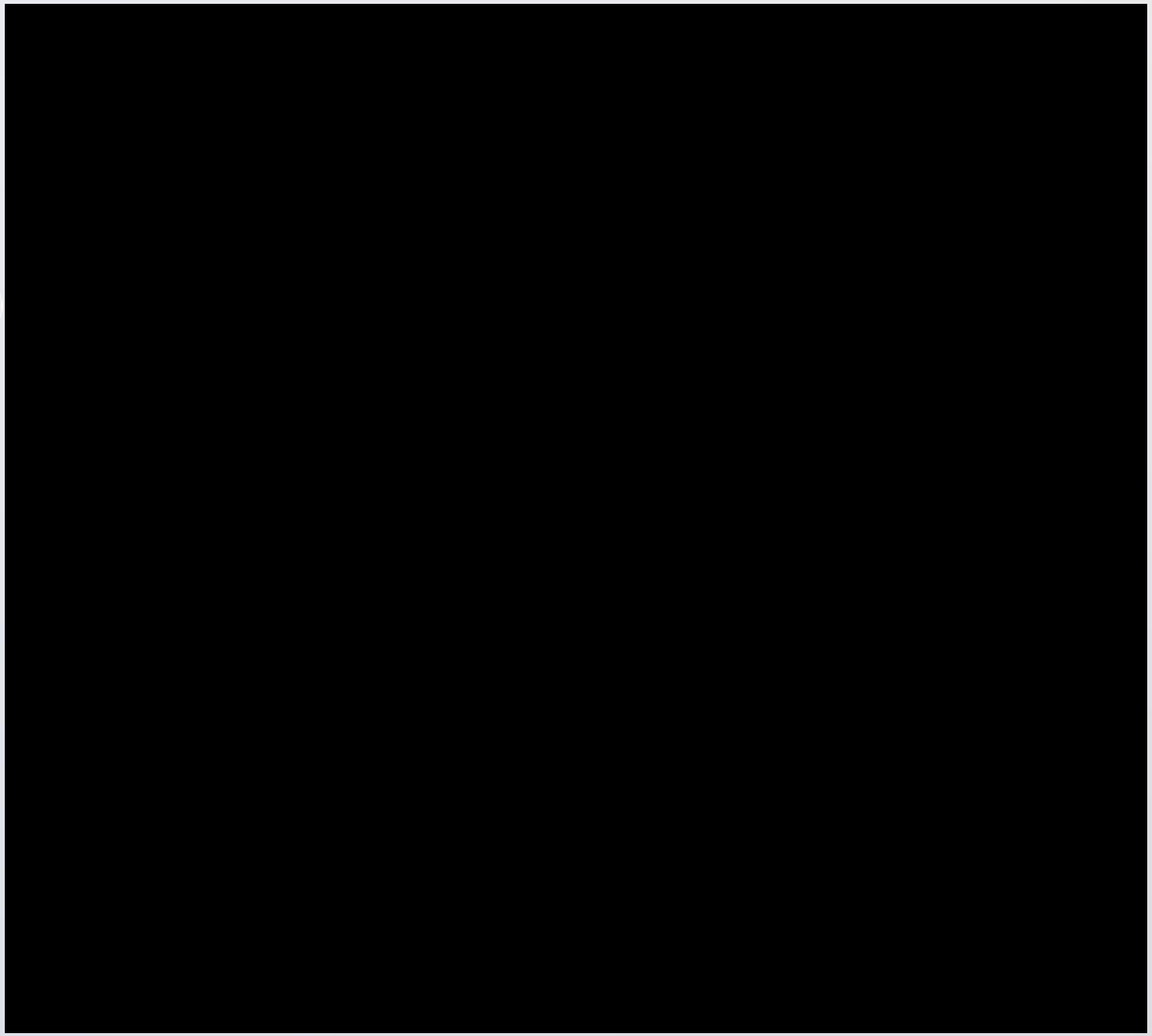


WHAT ARE ZINC WHISKERS?

Zinc whiskers are tiny conductive filaments of zinc typically less than a **few millimeters (mm) long** and only a **few thousands of a millimeter in diameter**.

They grow from metal surfaces (e.g. steel) that have been **electroplated (galvanized)** with zinc for corrosion protection.

The growth process consists of an **unpredictable incubation period** (months or perhaps even years) followed by a period of growth at rates **as high as 1mm/year.**



HISTORY OF WHISKERS

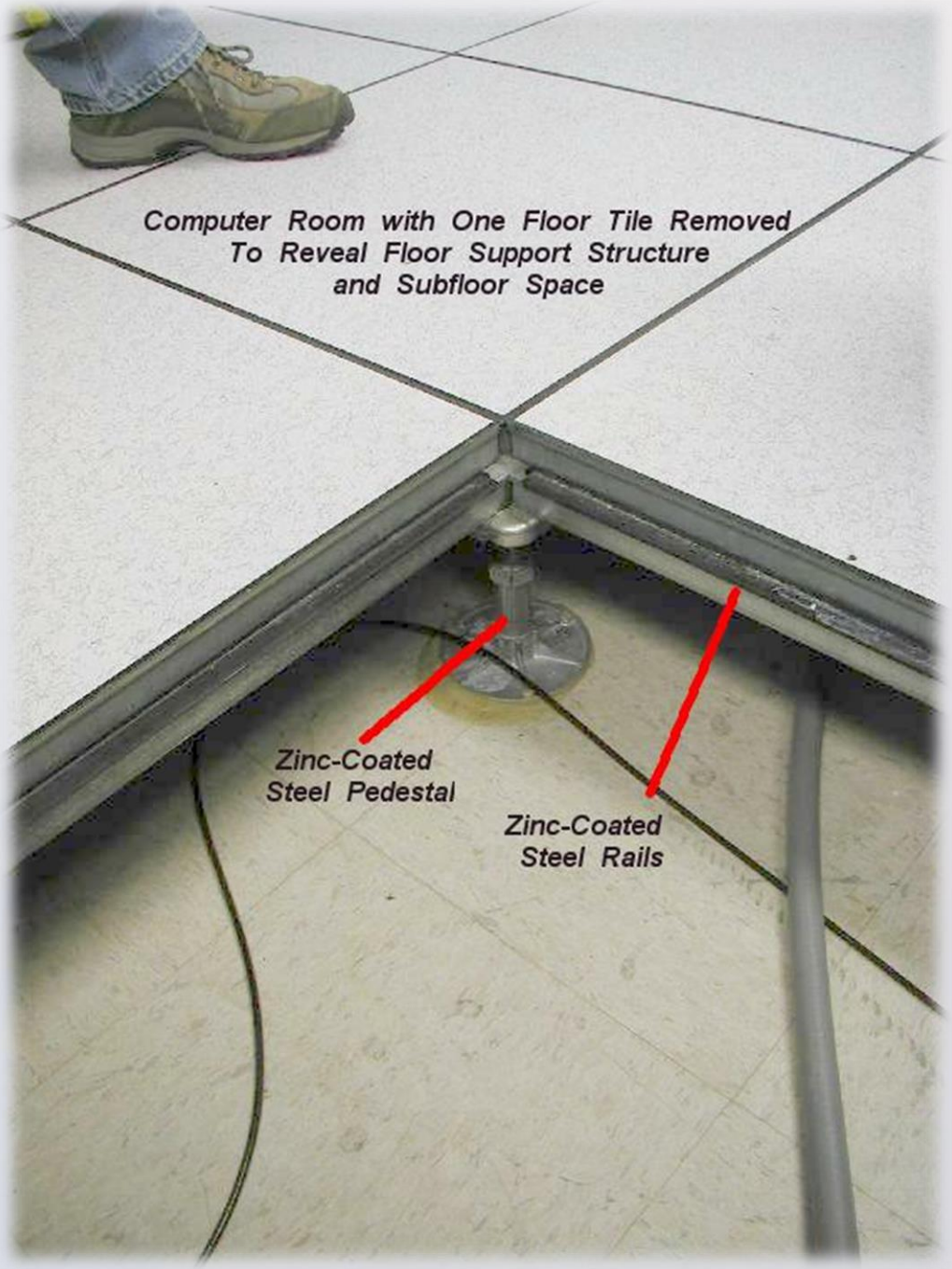
Zinc whiskers were first **discovered in 1948 by Bell Labs** when a "whisker" on a zinc-plated bracket caused increased losses in quartz filters used in a telephone transmission system superscript.

For the past several years, the electronics industry, as well as the metal and plating industry, has been aware of this phenomenon. IBM's AS/400 Physical Planning Reference V4R1 (SA41-5109-00) states: "**Raised floor tiles that have a zinc-electroplated passivation coating have the potential to grow zinc whiskers**. IBM believes zinc whiskers cause **intermittent AS/400 operational problems**. The AS/400 may **either post an error or power down**" superscript .

The main concern is that zinc is a **conductive material**. A whisker can be considered a **low-capacity fuse** with **DC resistance of 10W to 40W**, depending on the whisker geometry, with a **DC fusing current of 10mA to 30mA** superscript.

WHERE DO ZINC WHISKERS COME FROM?

- Typically wood-core access floor panels.
- Some concrete access floor panels.
- Building components:
  - Steel studs,
  - Suspended ceiling hangers & Grid Systems,
  - Electrical conduit
- Equipment cabinet frames
- Server frames (the actual computers),
- Cable trays (galvanized).



WHY NOW?

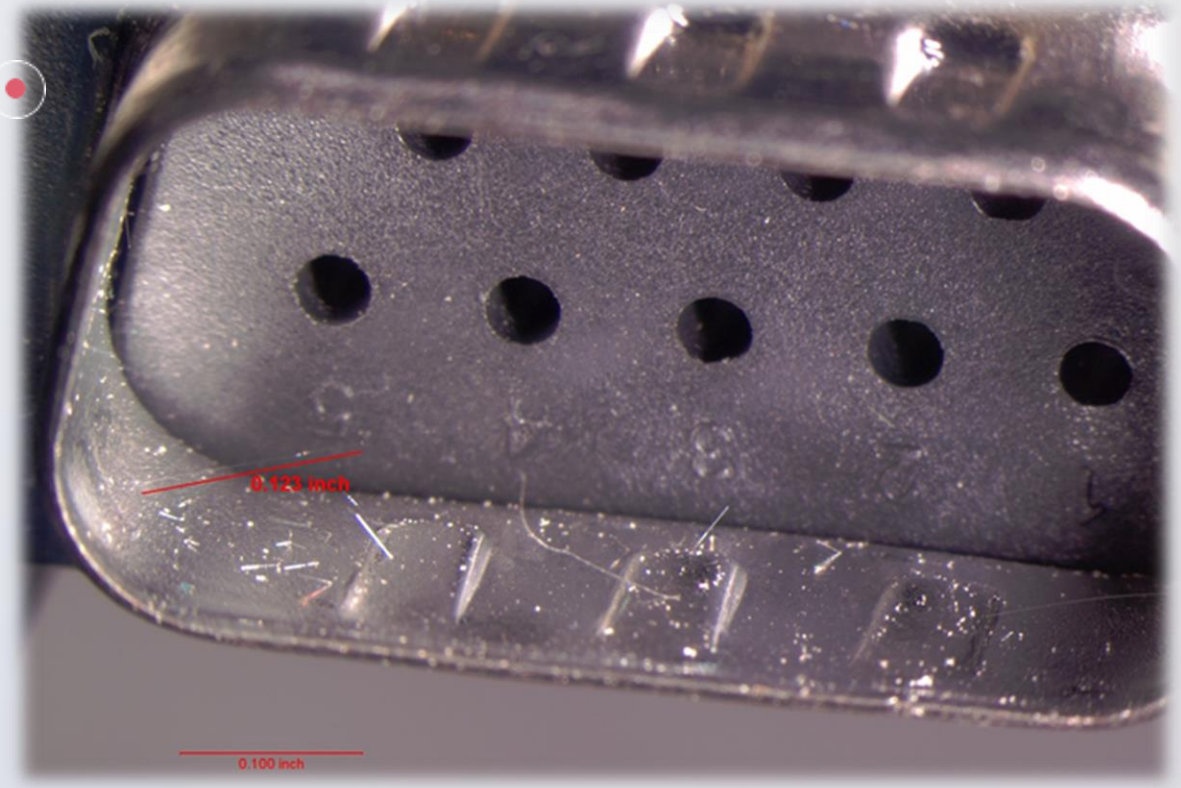
Several things are happening in TR's/CER's/DCs to cause zinc whiskers to be noticed now, such us:

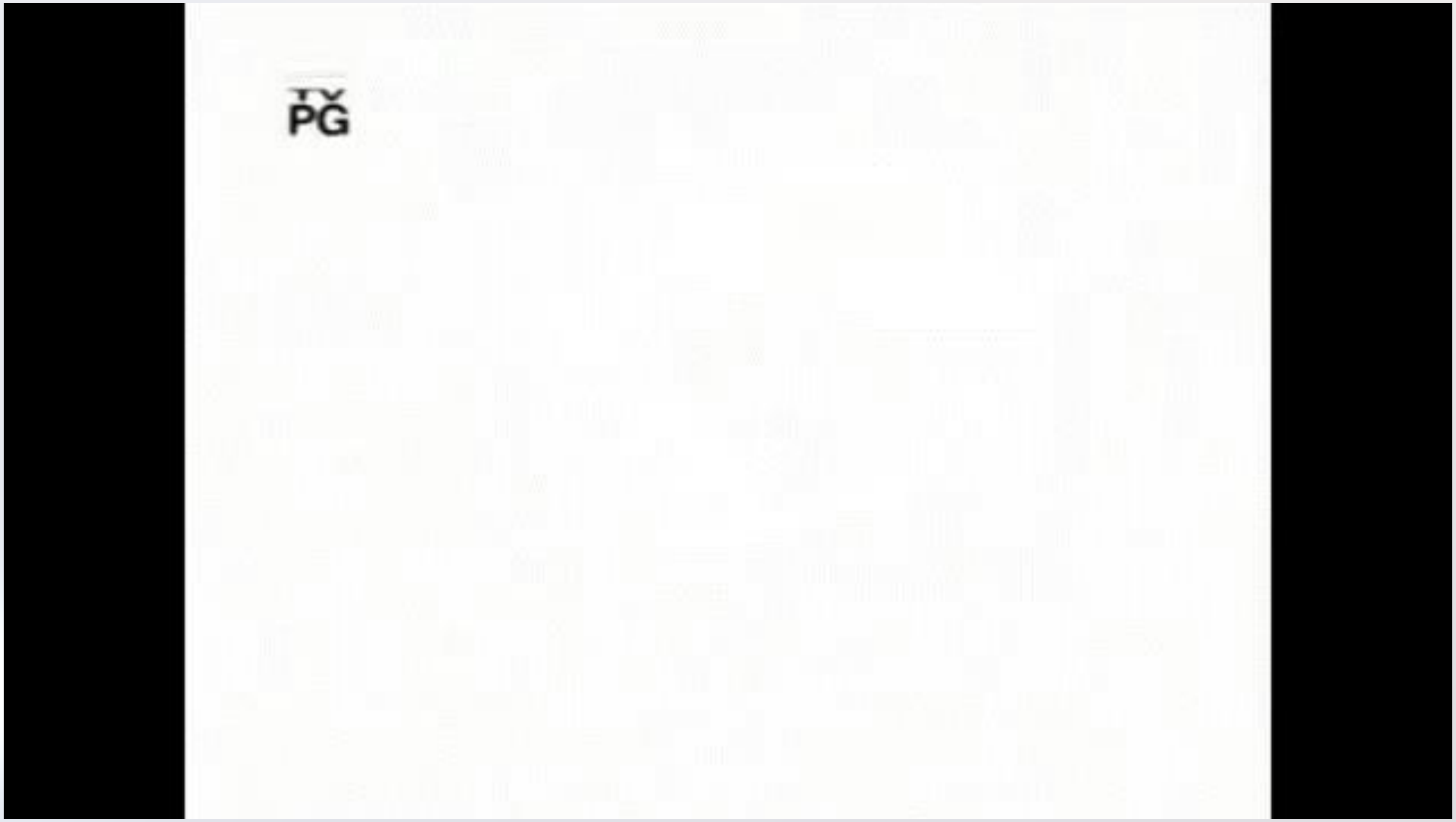
- The access floors are old enough and enough have broken off the panels, floated around and landed inside equipment.
- The continually shrinking size of electronic assemblies . The lead pitch (lead to lead spacing) on integrated circuits and other components has shrunk dramatically.
- The pathways and pathways systems are old enough and made of or plated with zinc.
- Traditional cabling components, cabinets and enclosures are also old enough and made of or plated with zinc.

OTHER METAL WHISKERS

Zinc is one of several metals known to produce whiskers. Others include:

- Antimony
- Cadmium
- Gold
- Indium
- Tin

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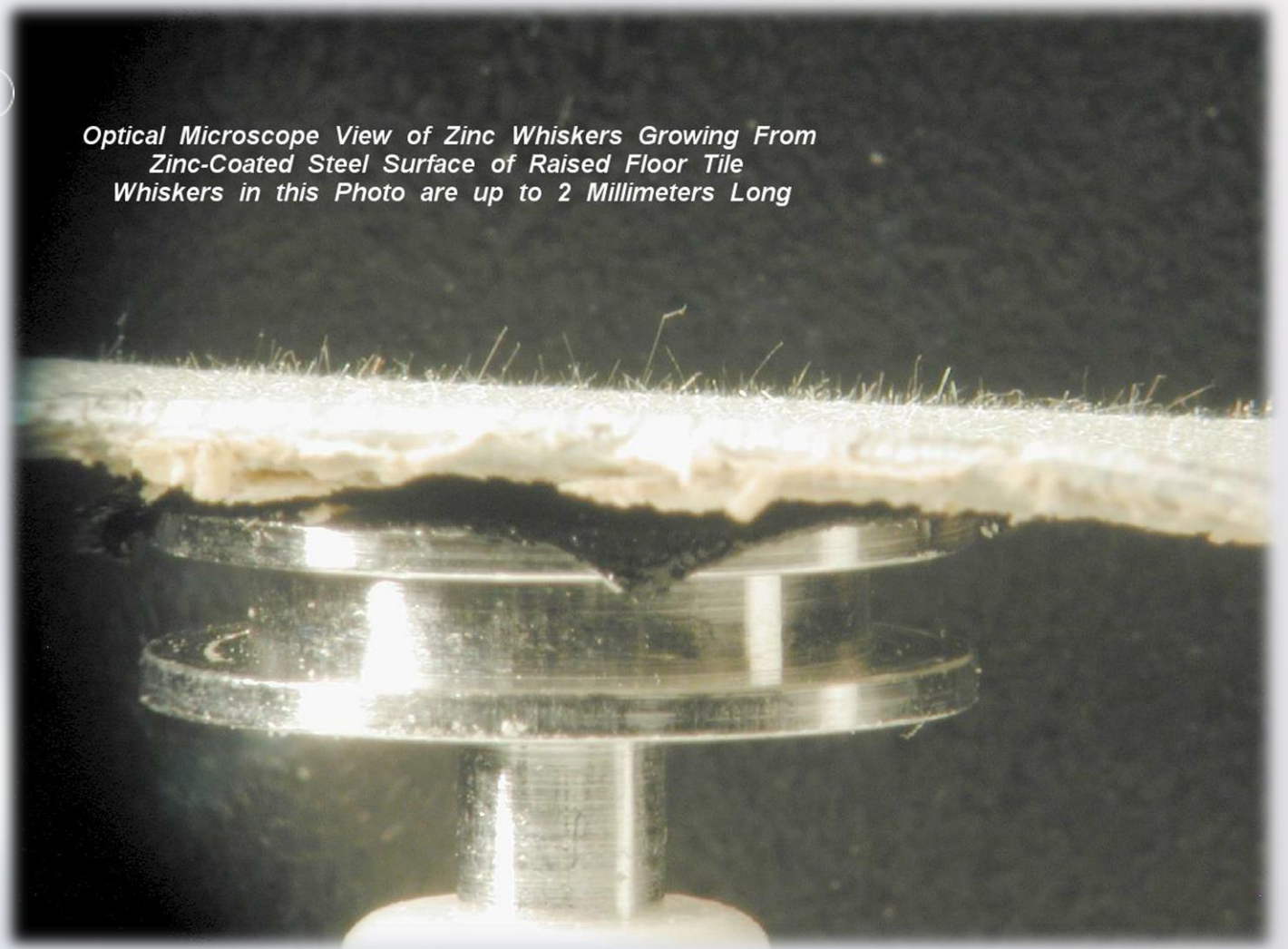
HEALTH EFFECTS OF ZINC WHISKERS

- No reported issues.
- No significant published research.
- Zinc is a natural nutrient – Consumed concentrations are reasonably low.
- Potential pathological impact from filaments based on geometry.

ZINC WHISKERS REMEDIATION

- Zinc whiskers are real, but manageable.
- Detection and mitigation is difficult:
  - Detection frequently requires trained expertise; user inspection is possible with proper precautions,
  - Mitigation strategies often involve COMPLETE removal and replacement of floor tiles, support structure, equipment racks, pathways, etc.
- Be proactive! Even if you haven't had problems, check your floor tiles, support structure, equipment racks, pathways, etc.
- If you think you may have zinc whiskers, get some money in your budget to replace all floor tiles, support structure, equipment racks, pathways, etc. before you have a problem.



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QUESTIONS?

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