Media Compliance for Archival Preservation of Electronic Records.

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What parameters to analyze when defining Media compliance for Archival Purposes?

• Compositional Stability and longevity

• Tolerance window of electronic signal with respect to environmental changes

• Error detection, correction & Quality Measurements
Magnetic Remanence Loss by Extended Period of Storage

- Loss of Magnetization, BM in %
- Years in Continuous Storage at 20°C or Lower and 50% or Lower RH

1. Gamma Ferro Iron Oxide, Barium Ferrite
2. Cobalt Adsorbed/Absorbed Gamma Ferric Oxide, MP
3. Cobalt ME
4. Chromium Di Oxide, Cobalt-Nickel ME

NOTE: Averaged sampled data shown for first 10 years.
- Projections based on accelerated life tests shown beyond 10 years.
- Lines show trends (absolute values may deviate from lines shown).

V. Navale, OSS, 2004
MP Tape Output Level Measurement Data

(13 Year Storage under Normal Office Environment)
Experimental data showing the effect of humidity on life expectancy of magnetic tapes

V. Navale, OSS, 2004
Experimental data showing effect of temperature on life expectancy of magnetic tapes

V. Navale, OSS, 2004
Estimated service life of prerecorded CD-ROM held at the Library of Congress.
W.P. Murray and C. Shahani, 2004

Lognormal Probability Plot for Normalized EOL at 25 C/ 50% RH

Table of Statistics
Loc 5.91713
Scale 1.74508
Mean 1702.37
StDev 7616.31
Median 371.345
IQR 1090.47
Failure 111
Censor 0
AD* 1.111
Phase Change Media Archival Life Projections

V. Navale, OSS, 2004
CD-R Disk Archival Life Projections

V. Navale, OSS, 2004
Temperature Effect

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Humidity Effect

![Graph showing the effect of humidity on inner parity error over time at 80°C.](image)

V. Navale, OSS, 2004
DVD-R Error Variability Study

[Graph showing error variability over time for different samples at 80°C and 90% RH]
Notes on magnetic and optical systems

• Similarity exists between Error distribution patterns for optical & magnetic recording systems
• Contributions from various sources of noise to single bit error follow different pattern for optical and magnetic systems
• On the reading side of optical media the detector and electronics generate as high noise as is contributed by recording irregularities.
Notes on magnetic and optical systems

- On optical systems it is possible to increase the power of the laser to meet the S/N ratio.
- Media defects can occur in both and authenticating of new media prior to preserving electronic records is important.
**What is Media “End of Life” Is it Unacceptable Signal Quality Criteria?**

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Error Rate after Correction</th>
<th>Error Rate Prior to Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio</td>
<td>$10^{-8}$</td>
<td>$10^{-4} \sim 10^{-6}$</td>
</tr>
<tr>
<td>Video</td>
<td>$10^{-6}$</td>
<td>$10^{-4} \sim 10^{-6}$</td>
</tr>
<tr>
<td>Imagery</td>
<td>$10^{-8}$</td>
<td>$10^{-4} \sim 10^{-6}$</td>
</tr>
<tr>
<td>Text</td>
<td>$10^{-12}$</td>
<td>$10^{-5} \sim 10^{-7}$</td>
</tr>
<tr>
<td>Numerical Data</td>
<td>$10^{-15}$</td>
<td>$10^{-5} \sim 10^{-7}$</td>
</tr>
</tbody>
</table>

* Error rate after correction is governed by the error rate prior to correction and the correction system (EDAC) capability.

V. Navale, OSS, 2004
References for the slides


V. Navale, OSS, 2004