# Impact of CMP/Cleaning Consumables on IC Device Yield and CoO

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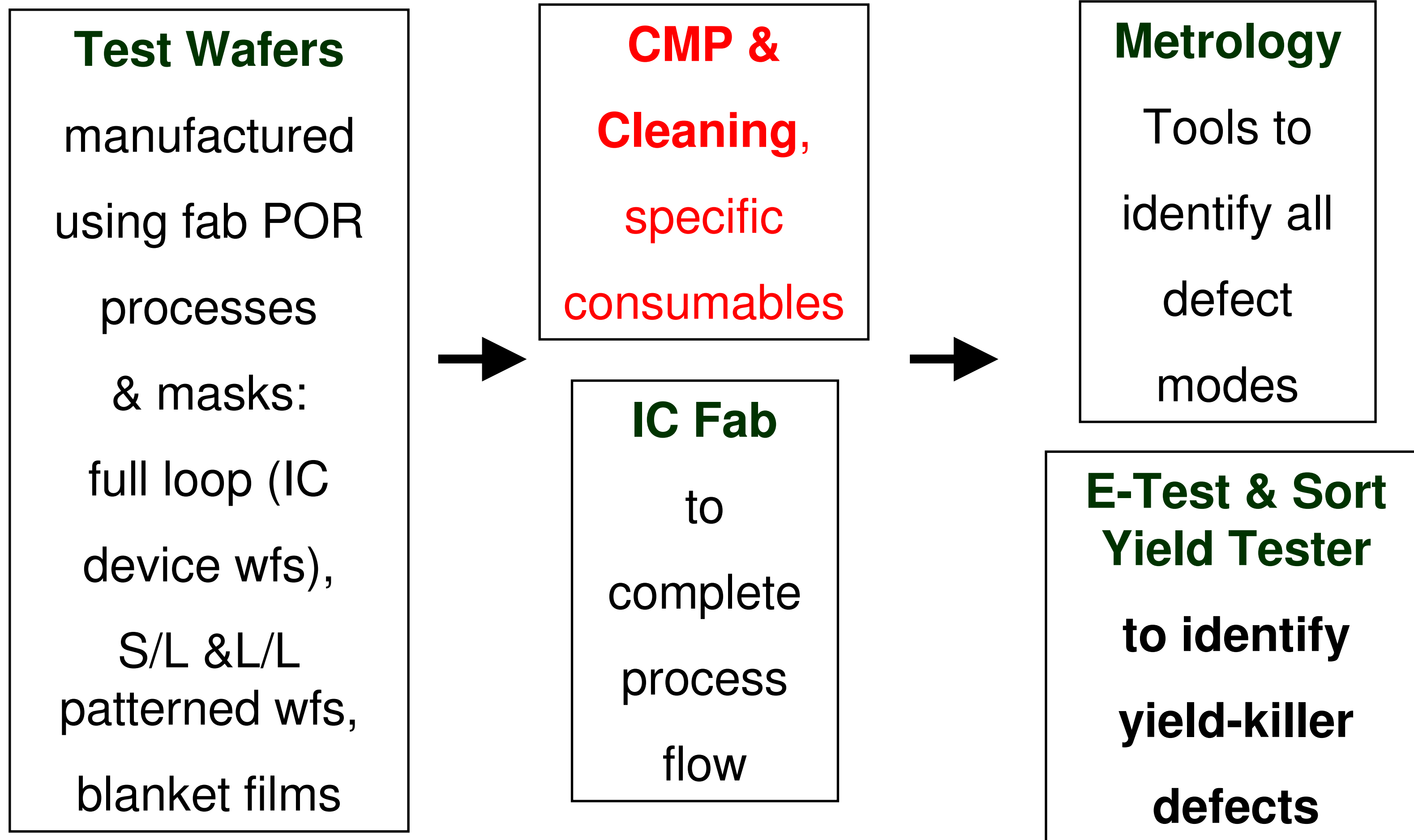
# How to Identify Yield Killer Defects?




**Consumable manufacturer + solution provider + IC fab partner = High ROI**



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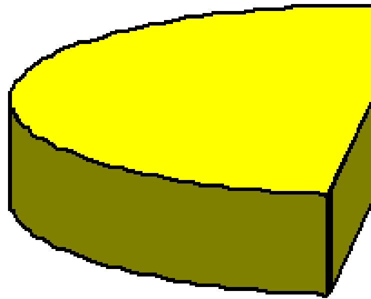
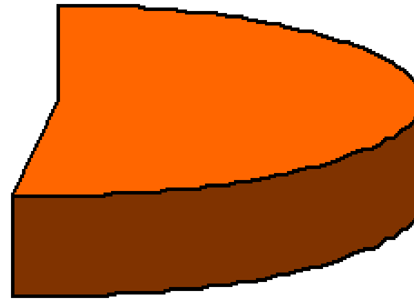
# Benchmark CoO of Legacy Ceria STI CMP in Advanced IC Production Fabs





- Yield loss attributed to CMP defects
- CMP/Cleaning Consumables/WFE/Labors/ Management

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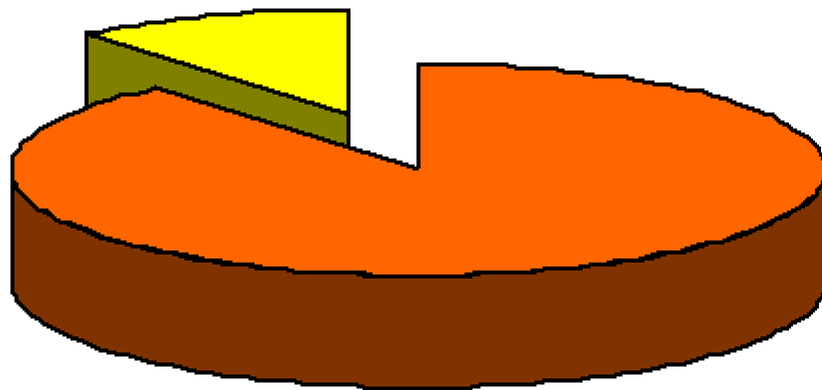
**CMP-defect-induced yield loss attributes to >50% CoO at legacy ceria STI CMP**

# Benchmark of IC Yield Loss due to the Defects Generated during Legacy Ceria STI CMP

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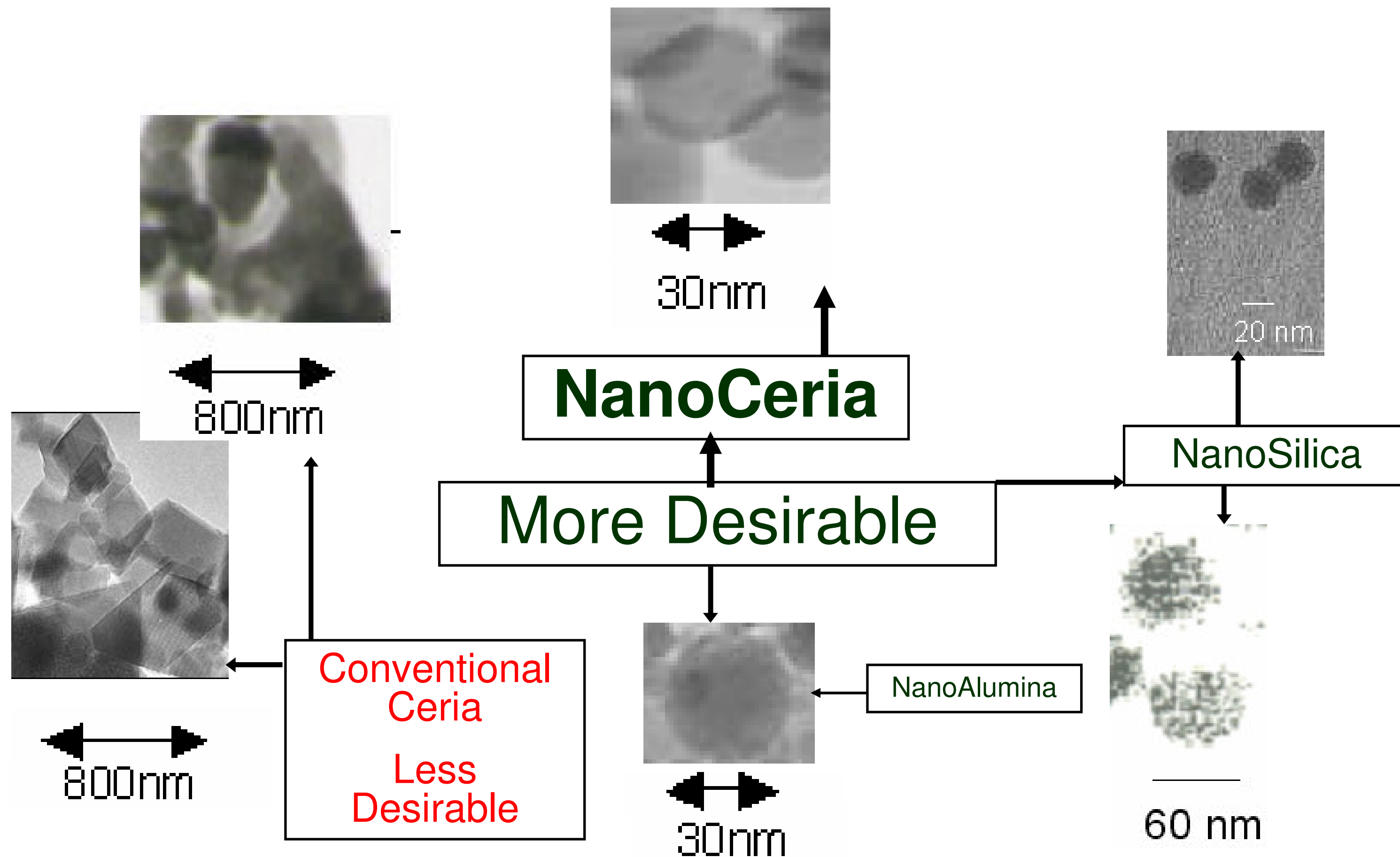
**Yield loss at legacy ceria STI CMP is attributed mainly to scratches, large and irregular shaped ceria particles**

# What Abrasive Particle is Desirable for Minimizing and Eliminating Defects?




**NanoCeria™ CMP solution is desirable for eliminating yield-killer defects**



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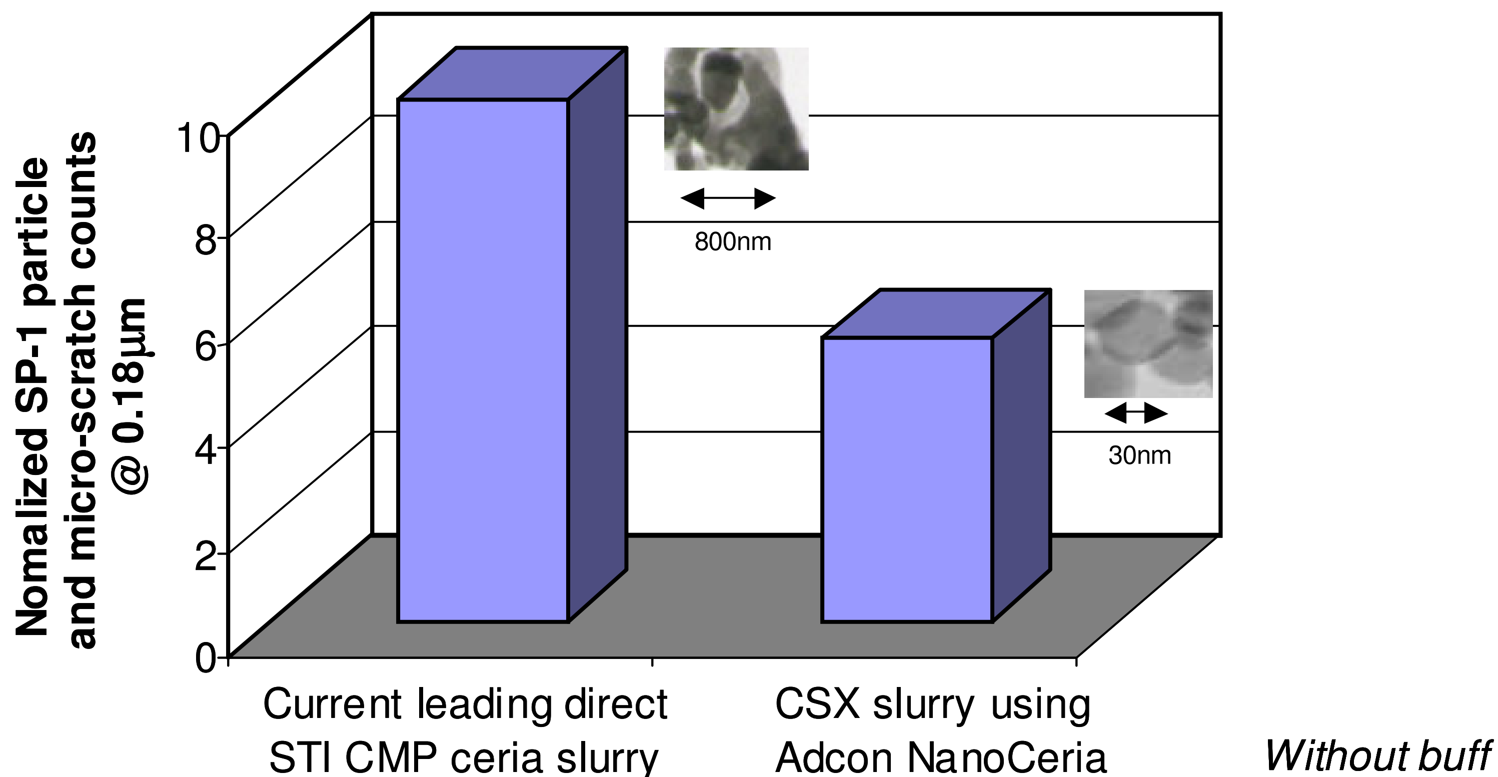
# Reduction of Direct STI CMP Defects and μ-Scratches by Adcon NanoCeria™ Slurry




*Without buff*

**NanoCeria™ based slurry reduces STI CMP defects and μ-scratches by >40%**

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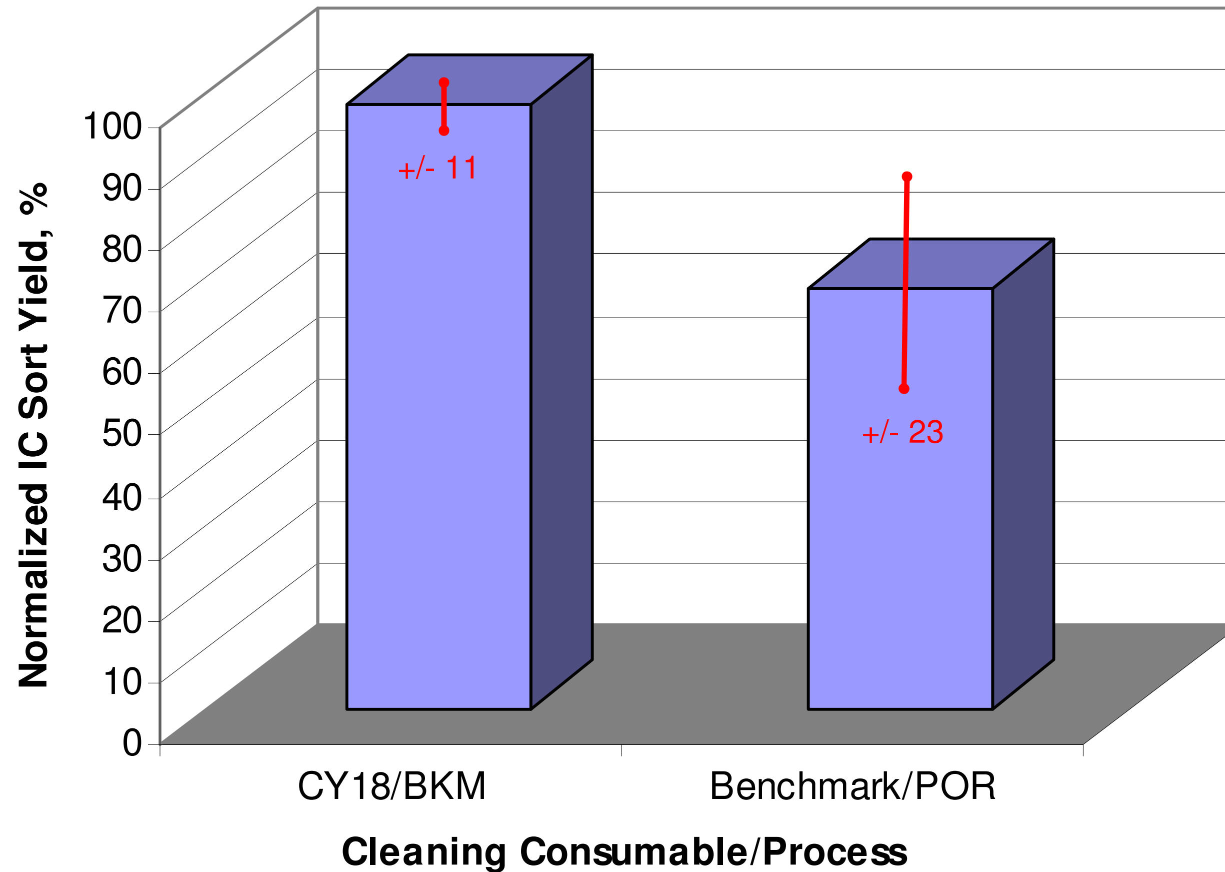
*C. Shang, et al., 8th Annual CMP Conf, AVS, Sept. 29, 2003.*

# Impact of Cleaning Consumable on IC Yield




**CY18™ cleaning solution improves IC device yield by 30% in production fabs**



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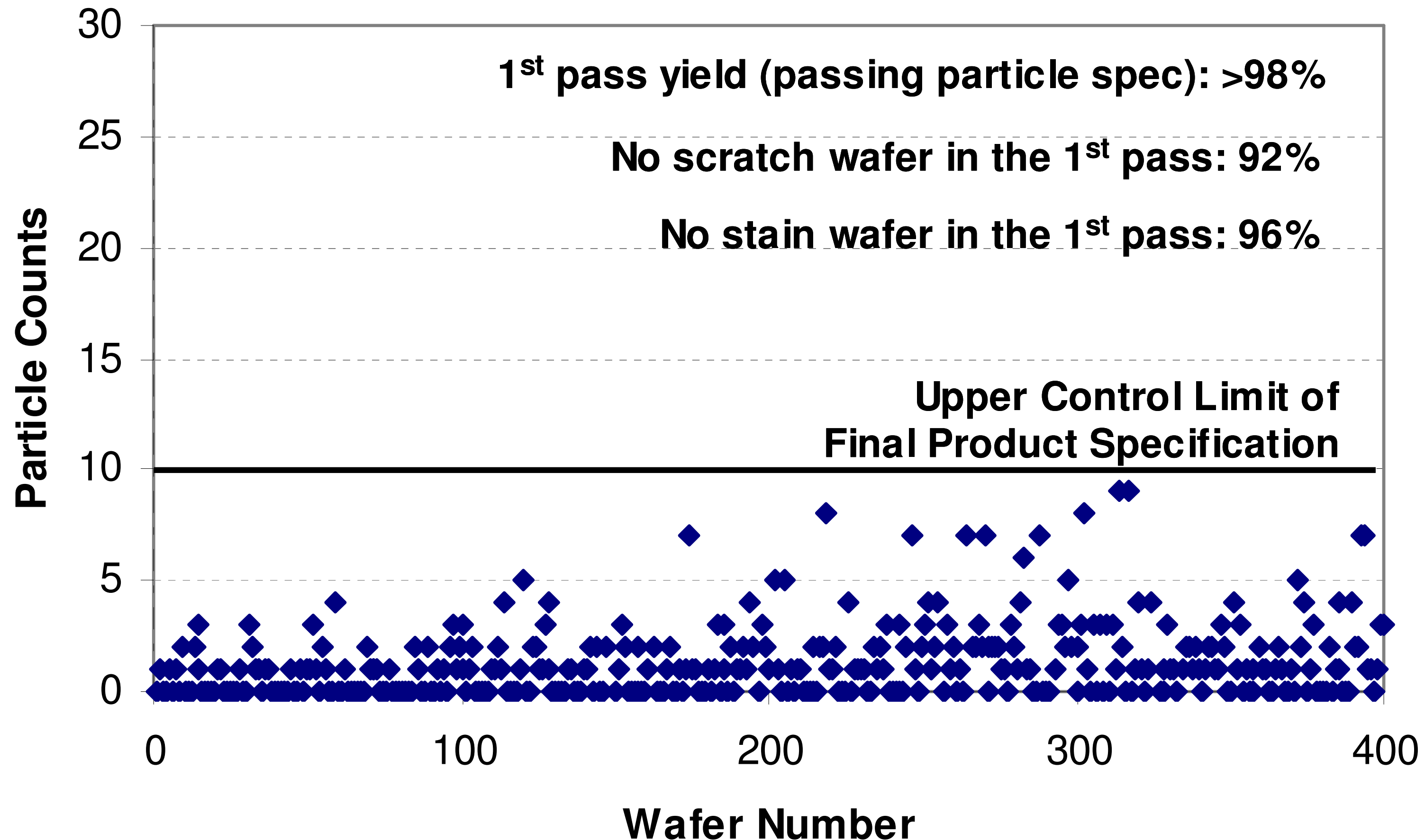
# Defect Performance at a Production Fab




**NanoSilica™ & NanoCeria™ CMP solution improves defect performance and reduces CMP CoO by >50% over a >3000-wafer continued production run**



*R. Jin et al., CMP Symposium, 2004 Semicon China.*

# Summary

- CMP-defect-induced yield loss attributes to >50% CoO at legacy ceria STI CMP at advanced tech nodes and the yield loss is attributed mainly to scratches, large and irregular shaped ceria particles
- Advanced consumable technologies (such as NanoCeria™ CMP solution and CY18™ cleaning solution) are promising with desired fab/supplier partnership in improving IC yield and reducing CoO for critical process modules (including direct STI CMP) at advanced tech nodes
- Low cost by design in a global consumable supply food-chain is effective in significantly reducing CMP CoO



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