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Cleanliness Related Efforts in IPC Standards

Determining How Clean is Clean

Doug Pauls
Rockwell Collins
Chairman, Cleaning and Coating Committees

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5-31: Cleaning Alternatives

- **5-31: Cleaning and Alternatives**
  - 5-31a Solvent Cleaning TG IPC-SC-60
  - 5-31b Semi-Aqueous Cleaning TG IPC-SA-61
  - 5-31c Aqueous Cleaning TG IPC-AC-62
  - 5-31d Cleaning Handbook TG IPC-CH-65
  - 5-31g Stencil Cleaning Handbook IPC-7526
- **New Revision Efforts Starting (Fall 2007)**
  - Chairman, Mike Bixenman, Kyzen Corporation
  - The Cleaning Handbooks (4) are up for revision
  - All will be revised and drawn into one Handbook
  - Efforts will focus on cleaning chemistries, cleaning equipment, and how they are inter-dependent
  - Not much evolution in the semi-aqueous materials

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5-32: Cleanliness Assessment

- **5-32a: Ionic Conductivity/Ion Chromatography TG**
  - John Radman, Trace Labs; Beverly Newton, Dionex
  - Present Activities
    - Round robin tests aimed at ionic test methods that are reproducible and repeatable – concentration on 2.3.28
    - Beginning work on a method for Bare Board Cleanliness by IC
      - Will become IPC-Tm-650, method 2.3.28.2
    - Other potential future work for Ion Chromatography
      - Users Guide for Ion Chromatography
      - Test methodology for spot extractions
      - Test methodology for small components

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5-32: Cleanliness Assessment

- **5-32b: Surface Insulation Resistance TG**
  - Chris Mahanna, Robisan Labs
  - Present Activities
    - IPC-9201 Revision A (SIR Handbook) just published
    - Focusing on newer SIR test methodologies such as continuous monitoring, the 28 day HP test, J-STD-004 SIR flux qualification
    - Recently released method 2.6.3.7, which incorporates continuous monitoring
      - Can be used either for flux qualification or process qualification
      - Monitoring every 20 minutes for 96 hours minimum
    - Watching the Hewlett Packard 28 day electromigration test method
    - Working on accept/reject criteria for B-52 test board
    - Reviewing data from several UK/EU consortia efforts

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5-32: Cleanliness Assessment

- **5-32c: Bare Board Cleanliness Assessment TG**
  - Doug Pauls, Rockwell Collins
  - Tutorial information
    - IPC-5701 – Guidance for Purchasers - Published
    - IPC-5702 – Guidance for OEMs – Published
    - IPC-5703 – Cleanliness for Fabricators – in draft stage
    - IPC-5704 – Cleanliness Requirements for Bare Board Cleanliness - draft
  - Present Activities
    - Rockwell Collins IPC-B-52 Research Program
      - Bare Board Cleanliness by IC and SIR
      - Process Qualification by IC and SIR
    - Round robin studies for ion chromatography repeatability
    - Working on adopting the Delphi bare board cleanliness standard into IPC format – will become IPC-5704
    - Working with ICTG on drafting the Delphi method into IPC format

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5-32: Cleanliness Assessment

- **5-32e: Electrochemical Migration TG**
  - Dr. Beverley Christian, RIM; Karl Sauter, Sun Microsystems
  - Responsible for:
    - All things related to electrochemical migration testing
    - Responsible for Conductive Anodic Filament (CAF) Resistance Test Method, 2.6.25 and associated Users Handbook
  - Present Activities
    - Has completed work on the CAF Resistance Method Users Handbook and has published this Handbook
    - Is reviewing data on the Hewlett Packard 28 day test method and other industry papers on CAF

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IPC-B-52 Research Program

- Co-operative effort between IPC and IEC
  - IEC efforts being led by Graham Naisbitt, Gen3 Systems and Dr. Chris Hunt, NPL
- Both IEC and IPE desire a process qualification test vehicle and test methodology
  - Most IPC/IEC test coupons (e.g. B-24 board) are designed for material qualification on a common platform
  - Such boards often bear no resemblance to actual product
    - B-24: FR-4 (T_G 140), bare copper, no solder mask
    - Product: FR-4 (T_G 170), solder mask, immersion silver
- Two highly similar test vehicles developed
  - IEC: TB-57 board (version 7.1 is current)
    - Board designed for SIR testing
  - IPC: IPC-B-52 board
    - Similar to the TB-57, but with some additional coupons
- Paper from Apex 2006 has details of both

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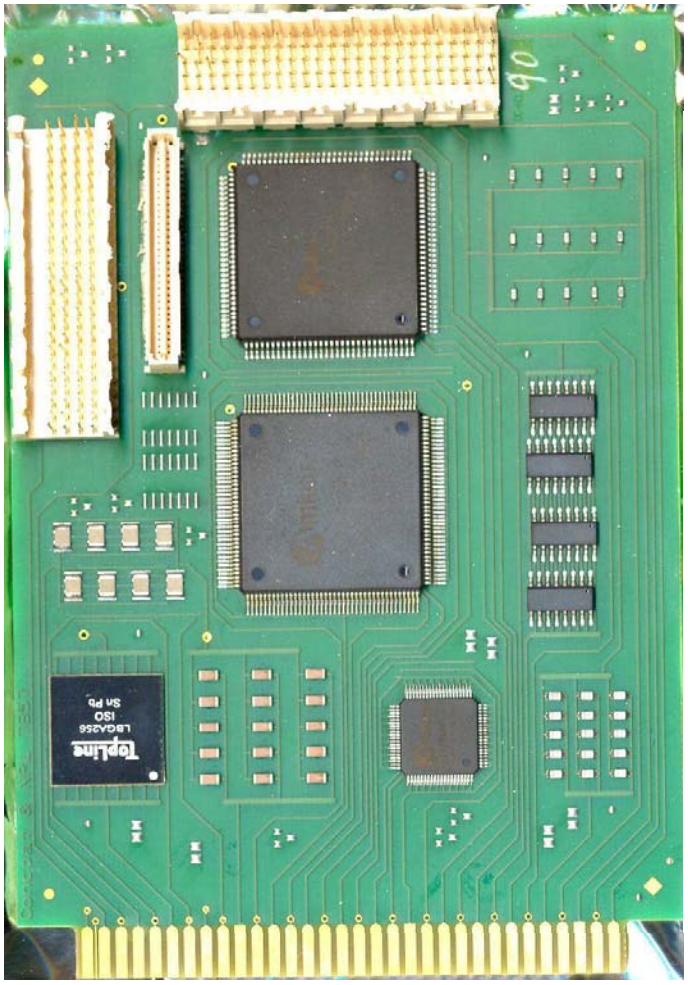
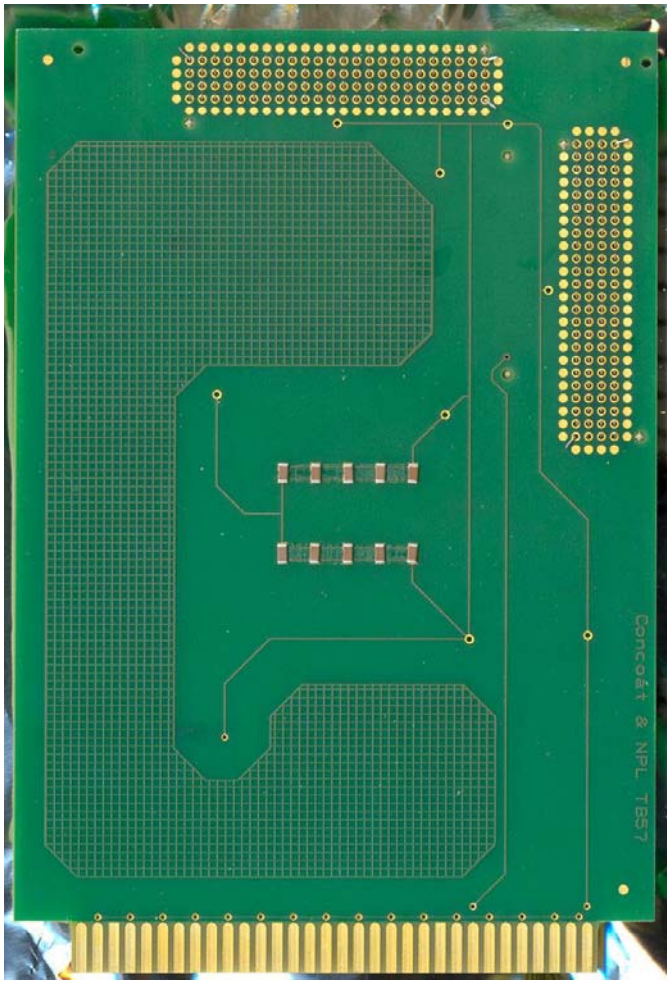
IEC-TB-57 Board





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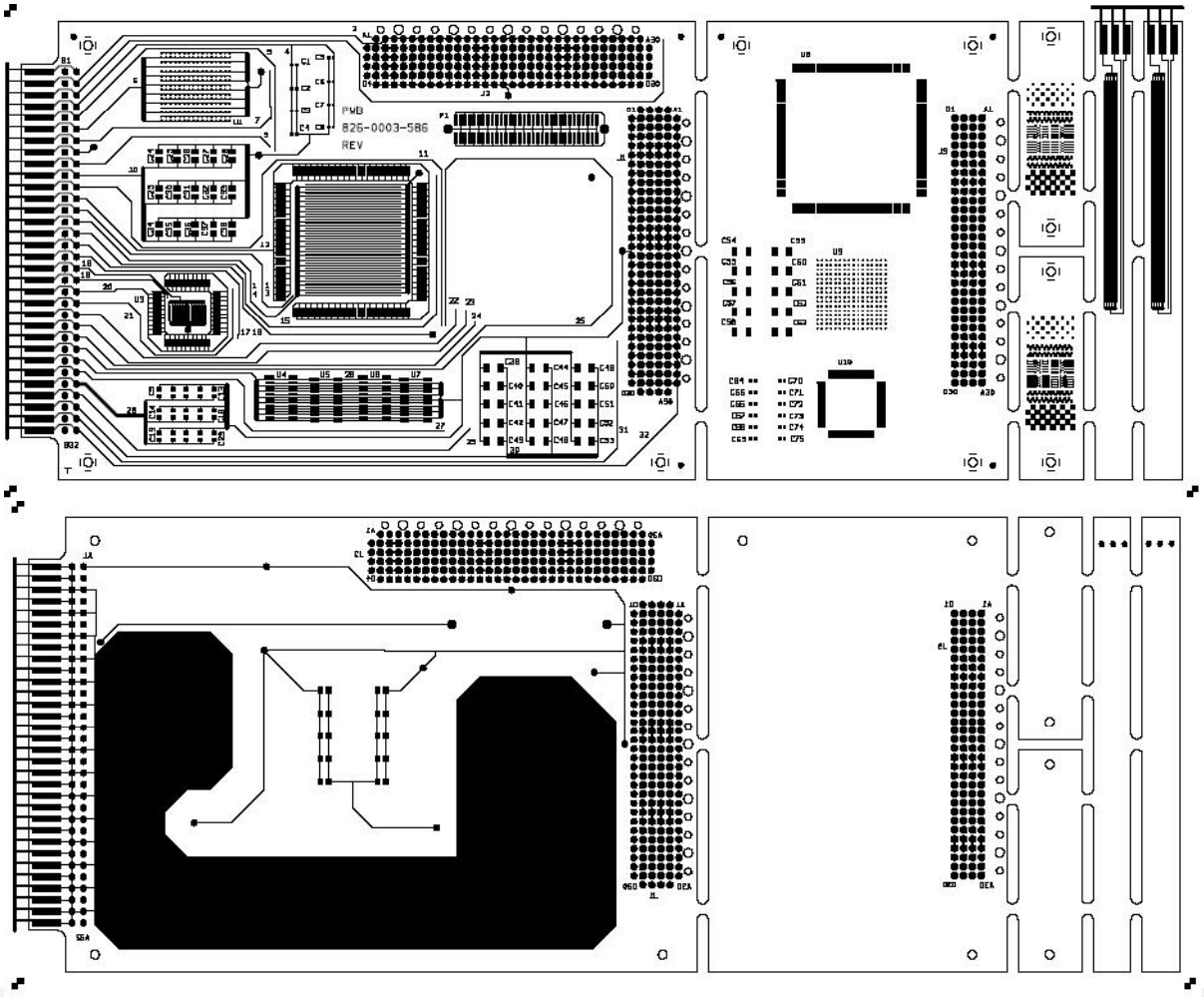
IPC-B-52 Board



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B-52 Bare Board Testing

- ***Free Testing – Yes, it says FREE***
  - Rockwell Collins will test 5 bare boards – IC, SIR, adhesion
  - Nice nifty report (yet to be developed)
  - PROVIDED – You supply Doug with this information
    - Who you are, e.g. Farquart J. McGillicudy III, Whozit Corp
    - Fabricator and location, e.g. CPC, Cedar Rapids, IA
    - Solder mask, e.g. Taiyo PSR-4000, Type BN
    - Surface Finish and type, e.g. MacDermid Sterling ImAg
- 3 Companies have participated so far
- This information being collected to support development of bare board cleanliness standards
  - Correlating ion chromatography data with SIR performance

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Sample IC Report

RC Lab ID	Descr	F	Cl	NO2	Br	NO3	PO4	SO4	Total Halide	Total Anions
	Set 2									
040907-03	Sample 1	0.01	0.11	0.00	1.52	0.09	0.00	0.18	1.64	1.91
040907-04	Sample 2	0.01	0.07	0.00	0.76	0.00	0.00	0.18	0.84	1.02
040907-05	Sample 3	0.00	0.15	0.00	1.66	0.11	0.00	0.18	1.81	2.1
040907-06	Sample 4	0.01	0.09	0.00	1.17	0.07	0.00	0.18	1.27	1.52
040907-07	Sample 5	0.01	0.09	0.00	1.04	0.06	0.00	0.15	1.14	1.35
		0.01	**0.10**	**0.00**	**1.23**	**0.07**	**0.00**	**0.17**	**1.34**	**1.58**

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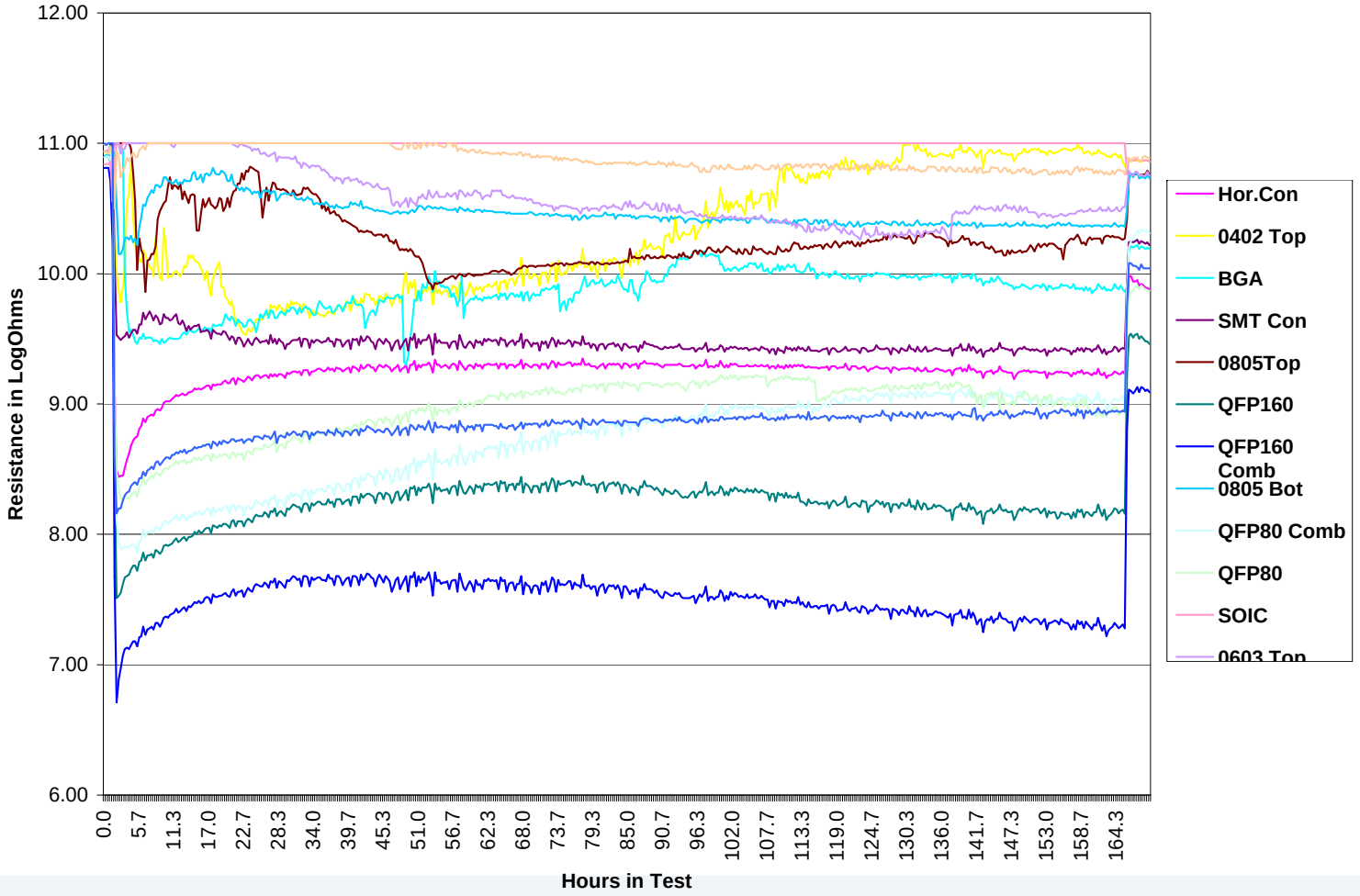
Sample SIR – FR4



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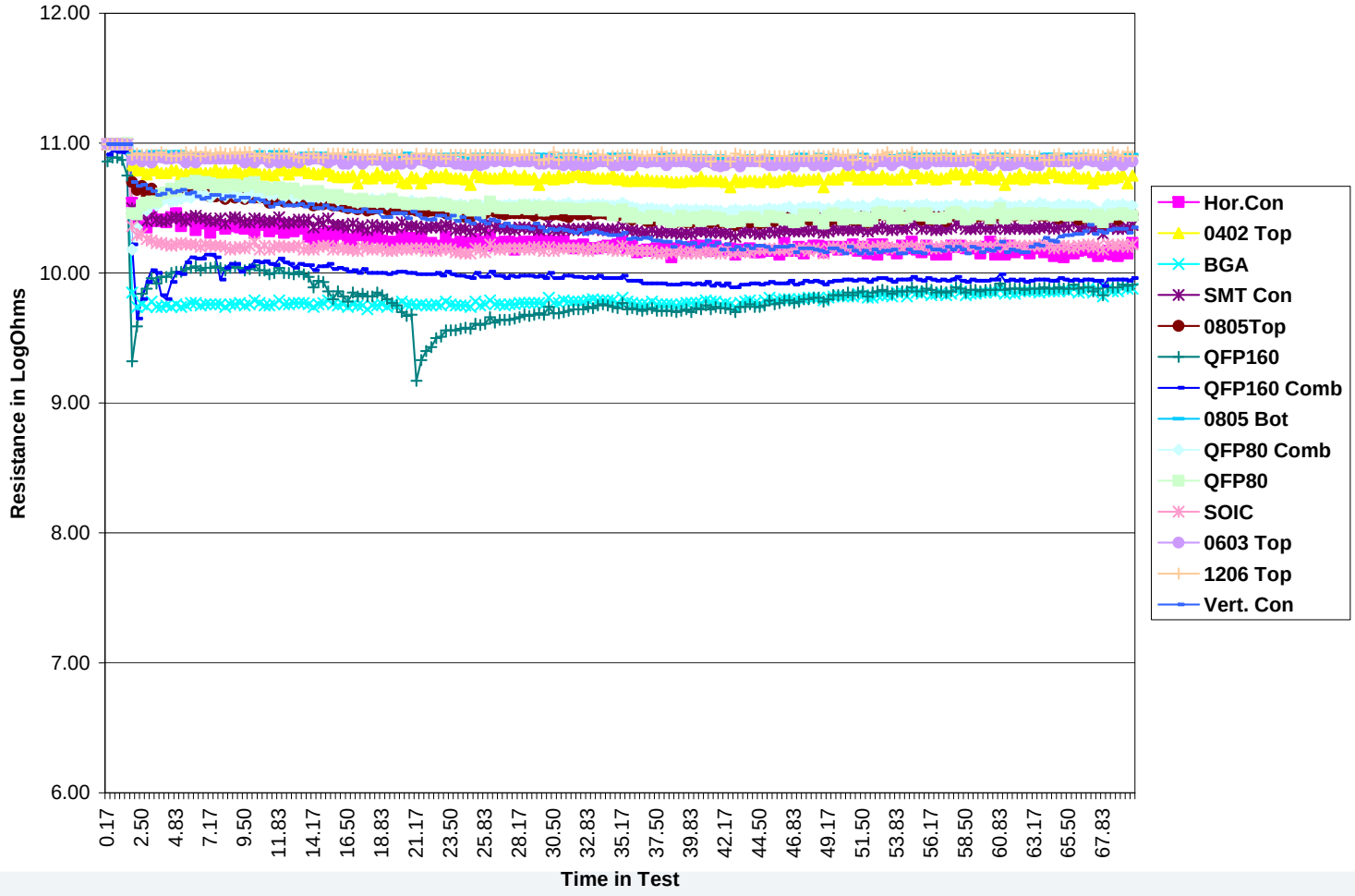
Sample SIR – Polyimide



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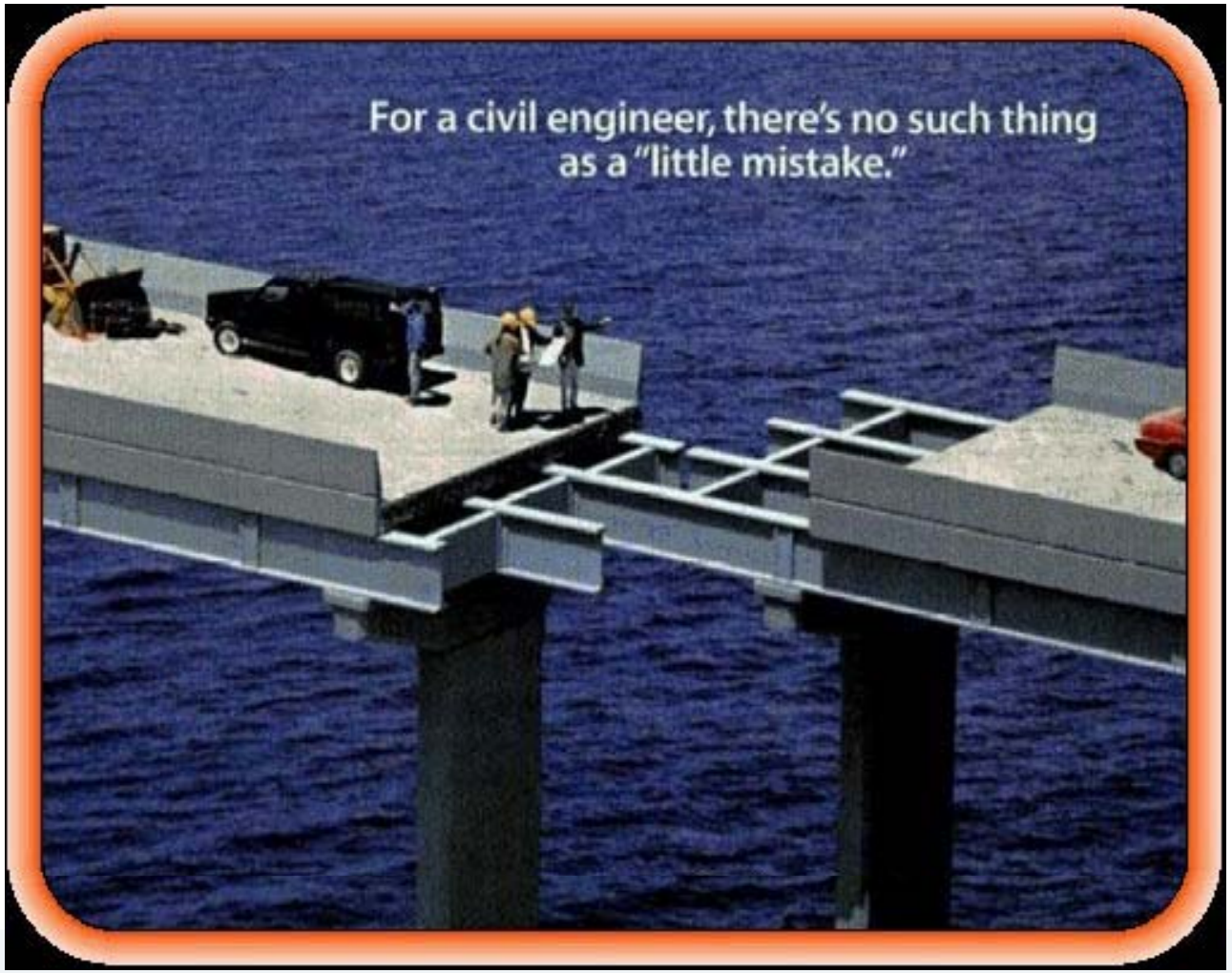
Questions?



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