Test Monitoring Center
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Pittsburgh, PA 15206-4489
(412) 365-1000

MEMORANDUM: 04-029

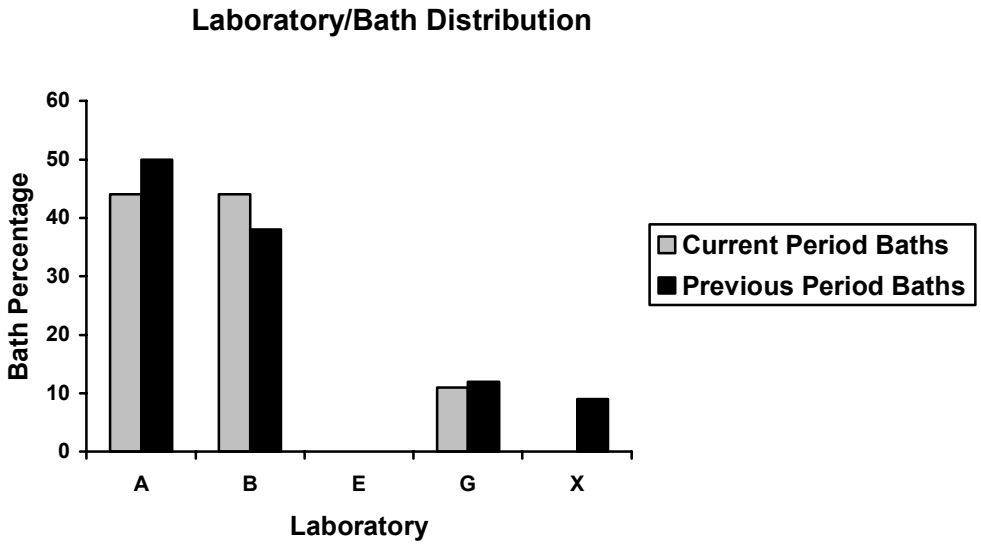
DATE: April 16, 2004

TO: Joe Franklin, Chairman, CBT Surveillance Panel

FROM: Jeff Clark

SUBJECT: High Temperature Corrosion Bench Testing for the April 2004 Report Period

A total of 123 High Temperature Corrosion Bench Test results from nine baths in three labs were reported to the TMC during the April 2004 ASTM report period, which began on October 1, 2003 and ended on March 31, 2004.



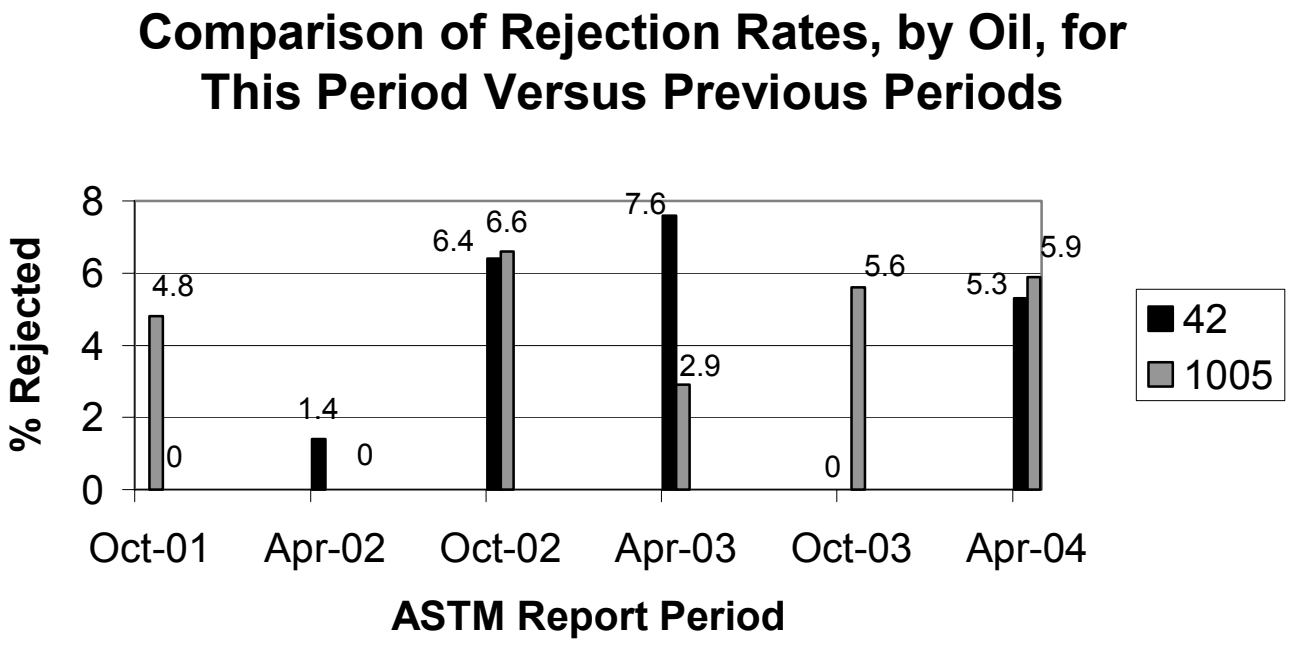
The following summarizes the status of the reference oil tests reported to the TMC:

	TMC Validity Codes	No. of Tests
Operationally and Statistically Acceptable	AC	113
Failed Acceptance Criteria	OC	7
Operationally Invalid, Lab Judgement	LC	0
Aborted	XC	3
Total		123

All three aborted tests were due to a power failure. The following tabulates the statistically unacceptable tests:

Reason	Number of Tests
Severe Copper (Reference oil 1005)	4
Severe Lead (Reference oil 1005)	1
Severe Copper, Severe Lead (Reference oil 1005)	1
Severe Copper, Mild Lead (Reference oil 42)	1

A total of 19 operationally valid results were run on reference oil 42 of which 1 failed (5.3% fail rate). A total of 101 operationally valid results were run on reference oil 1005 of which 6 failed (5.9% fail rate). The following presents the fail rate for this period with the fail rates of previous periods, by reference oil:

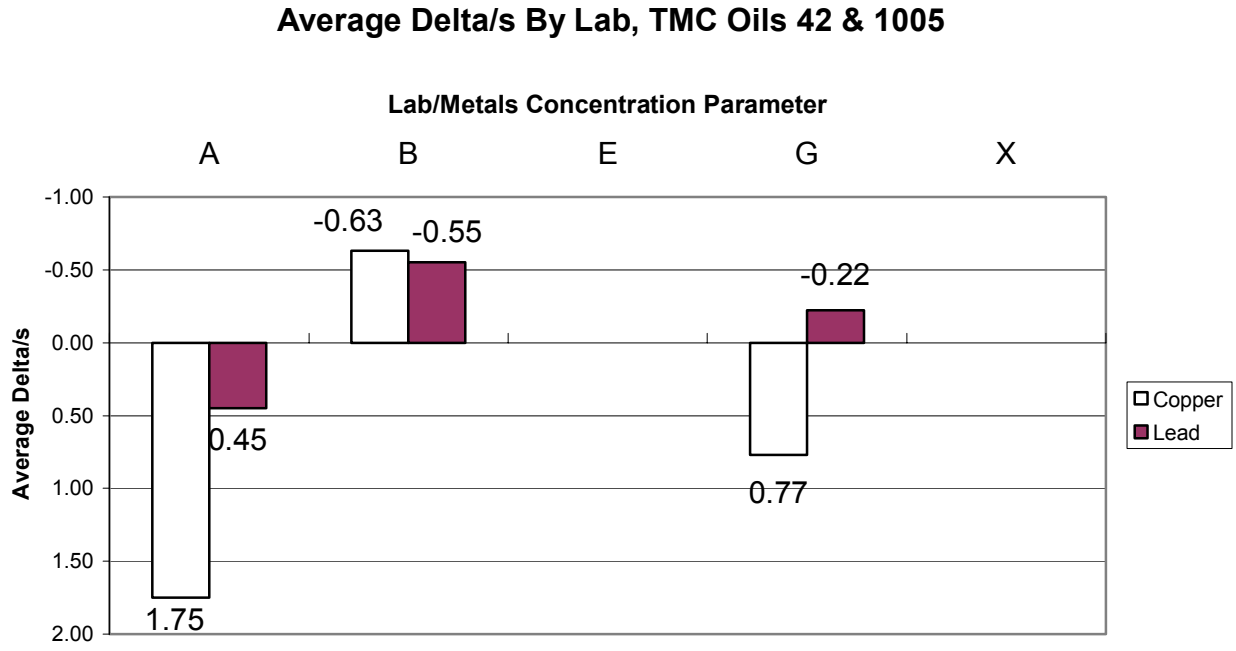


Industry Severity and Precision

The current severity for the change in metals concentration parameters on all operationally valid tests, for the current and previous periods, is tabulated below.

Period	n	Δ Cu Mean Δ/s	Δ Pb Mean Δ/s
10/1/03 through 3/31/04	120	0.35	-0.22
4/1/03 through 9/30/03	111	0.01	0.07
10/1/02 through 3/31/03	134	0.01	-0.26
4/1/02 through 9/30/02	124	0.30	0.22
10/1/01 through 3/31/02	137	0.02	-0.05

Figures 1 and 2 plot the Summation delta/s from target for both change in copper and change in lead, respectively. Figure 1 shows copper change to be severe for the period. Figure 2 shows lead change to be mild for the period. Laboratory severity for both reference oils 1005 and 42 is depicted below.



Industry Severity by Reference Oil

The industry performance (severity and precision) for reference oil 42, comparing the current period with the previous ASTM report periods, is tabulated below. Values in parentheses are in transformed (natural log) units.

Period	n	Δ Cu mean	Δ Cu s	Δ Cu Mean Δ/s	Δ Pb mean	Δ Pb s	Δ Pb Mean Δ/s
10/1/03 to 3/31/04	19	29.8 (3.393)	(0.597)	0.29	102.8	23.56	-0.21
4/1/03 to 9/30/03	57	26.5 (3.277)	(0.394)	0.09	107.9	13.60	0.00
10/1/02 to 3/31/03	66	26.8 (3.289)	(0.478)	0.11	100.1	19.53	-0.32
4/1/02 to 9/30/02	63	34.7 (3.546)	(0.492)	0.55	114.0	15.69	0.26
10/1/01 to 3/31/02	71	26.4 (3.274)	(0.376)	0.09	108.9	16.75	0.05

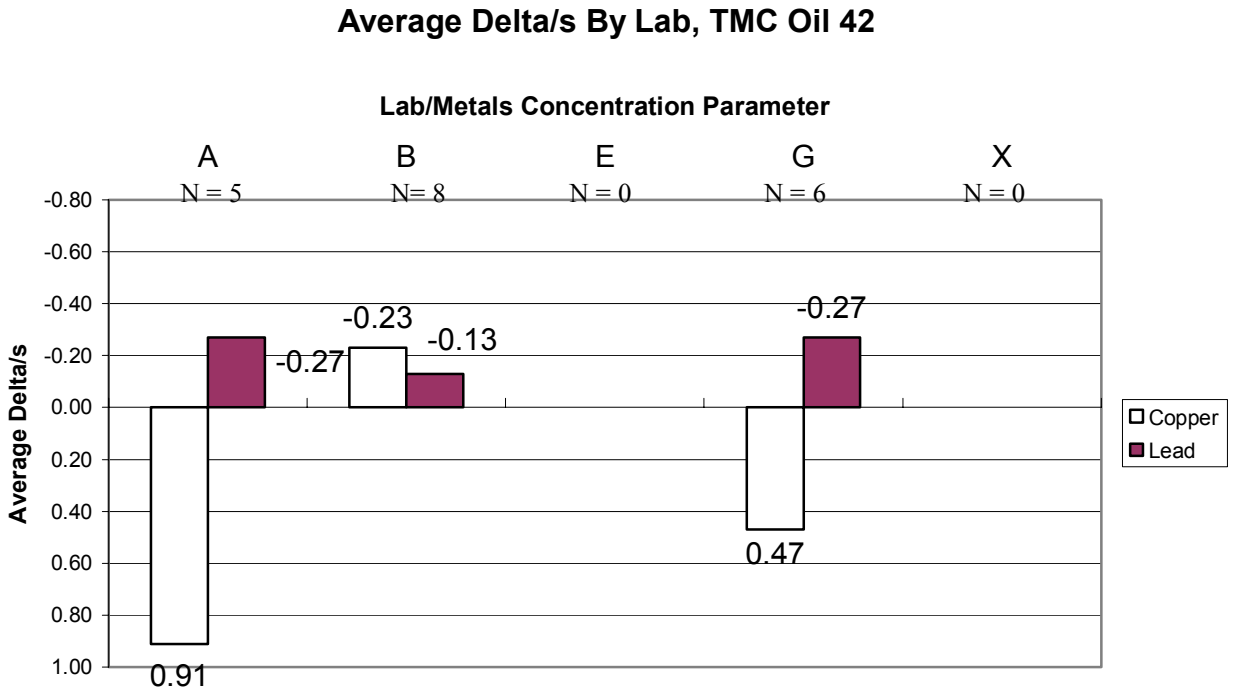
The industry performance (severity and precision) for reference oil 1005, comparing the current period with the previous ASTM report periods, is tabulated below. Values in parentheses are in transformed (natural log) units.

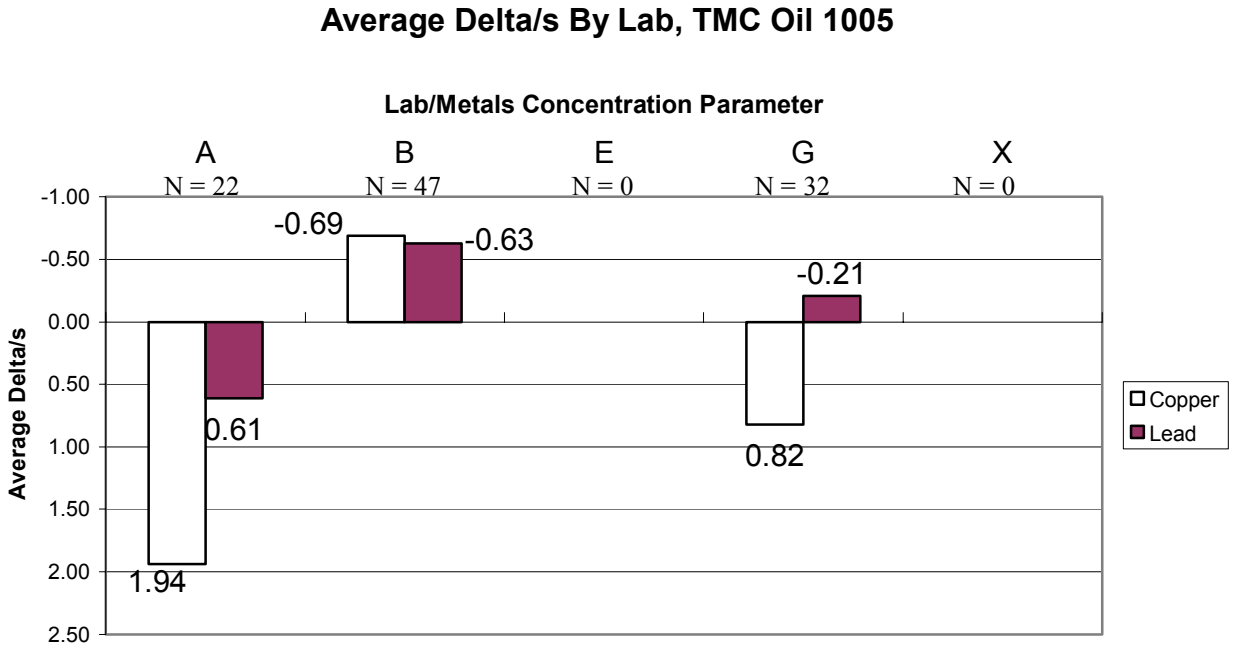
Period	n	Δ Cu mean	Δ Cu s	Δ Cu Mean Δ/s	Δ Pb mean	Δ Pb s	Δ Pb Mean Δ/s
10/1/03 to 3/31/04	101	10.0 (2.306)	(0.331)	0.36	29.3	10.0	-0.22
4/1/03 to 9/30/03	54	9.4 (2.246)	(0.166)	-0.07	34.1	47.1	0.14
10/1/02 to 3/31/03	68	9.4 (2.243)	(0.497)	-0.09	29.6	11.3	-0.20
4/1/02 to 9/30/02	61	9.6 (2.262)	(0.164)	0.04	34.4	15.0	0.17
10/1/01 to 3/31/02	66	9.5 (2.248)	(0.154)	-0.05	30.3	9.3	-0.15

Precision for copper on both oils shows some degradation compared to the previous period. Precision for lead shows degradation for oil 42 and significant improvement for oil 1005. For this period, copper was severe for both oils and lead was mild for both oils.

Laboratory Severity by Oil

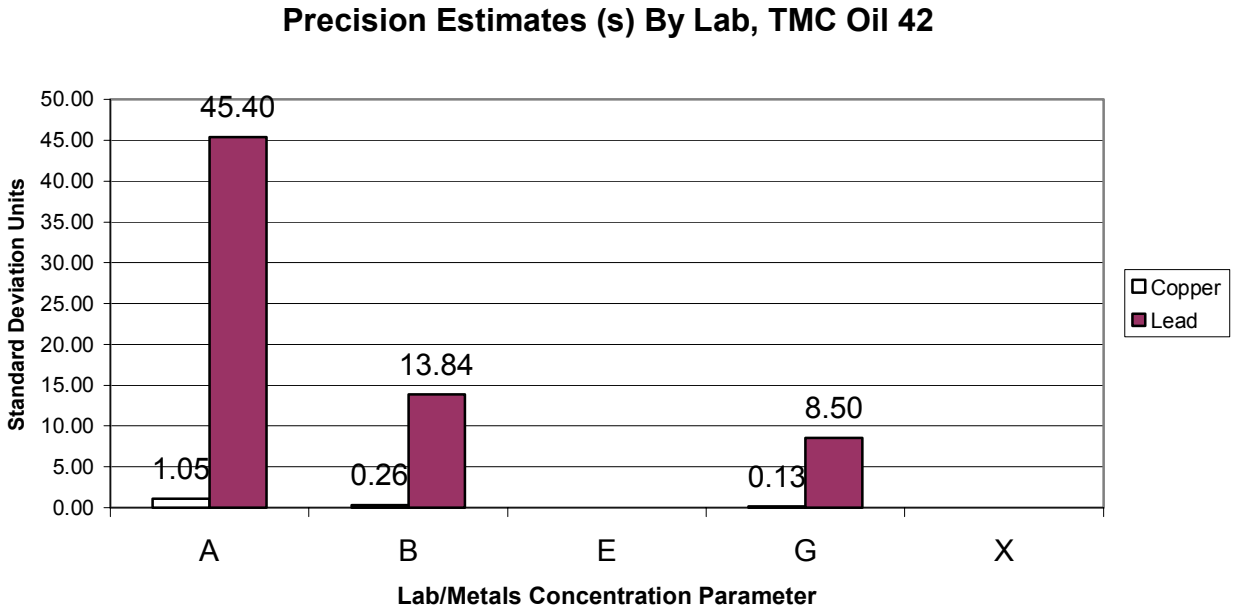
Severity for each oil is plotted by laboratory on the following page.

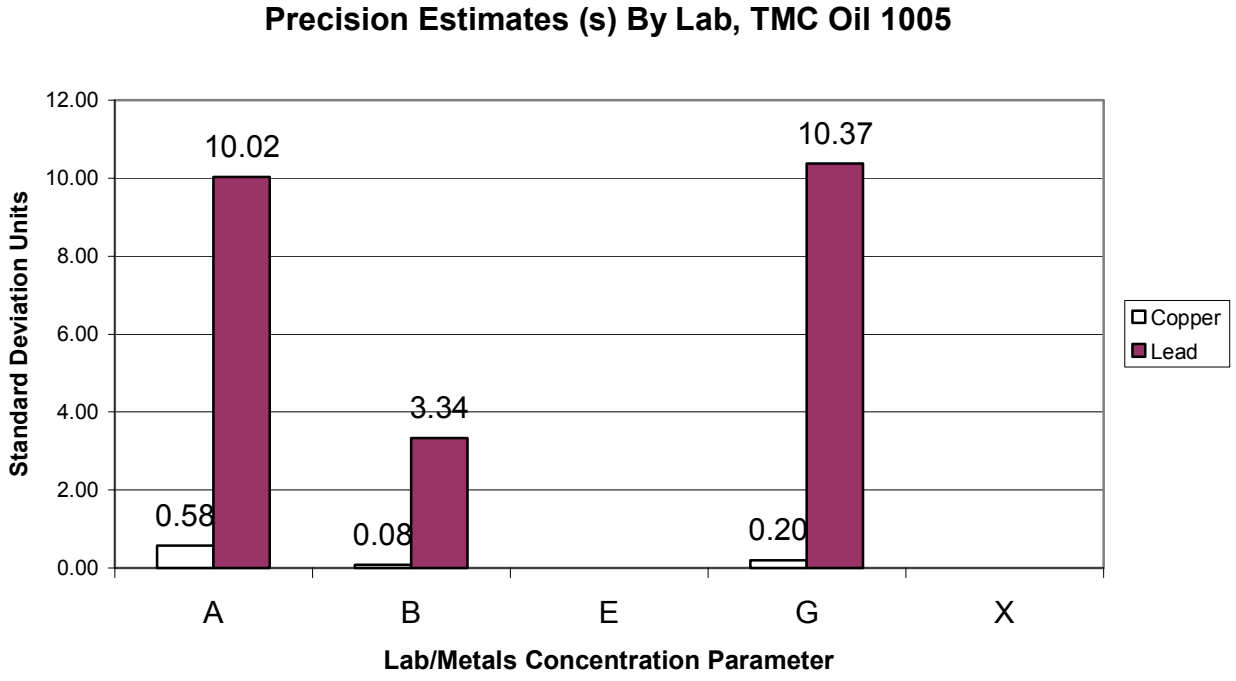




The charts show that lab B is mild for both parameters, on both oils. Lab A is severe for copper on both oils, mild for lead on oil 42 and severe on lead for oil 1005. Lab G is severe for copper on both oils, and is mild for lead on both oils.

The following plots show the precision for this period, by lab and oil.





Copper standard deviations were calculated in transformed (natural log, ln) units. For oil 42, both parameters showed a consistent ranking of variability with the highest variability at lab A, followed by lab B, and lowest at lab G. For oil 1005, lab A showed more variability relative to the other labs on copper, while lab B showed less variability relative to the other labs for lead.

Reference Oil Supply

Reference oil quantities available at the laboratories and TMC, as well as estimated life of these oils, are tabulated below.

Oil	TMC Inventory, in gallons	TMC Inventory, in tests	Laboratory Inventory, in tests	Estimated life
42	0	0	18	2 months
1005	63.8	~2040	17	17+ years

The TMC supply of oil 42 has been exhausted. The TMC is in the process of obtaining a 20-gallon re-blend of that oil.

Information Letters

No information letters were issued this report period.

Additional Information

The HTCBT database is available from the TMC's website. If you are uncertain of how to access this data, contact the TMC.

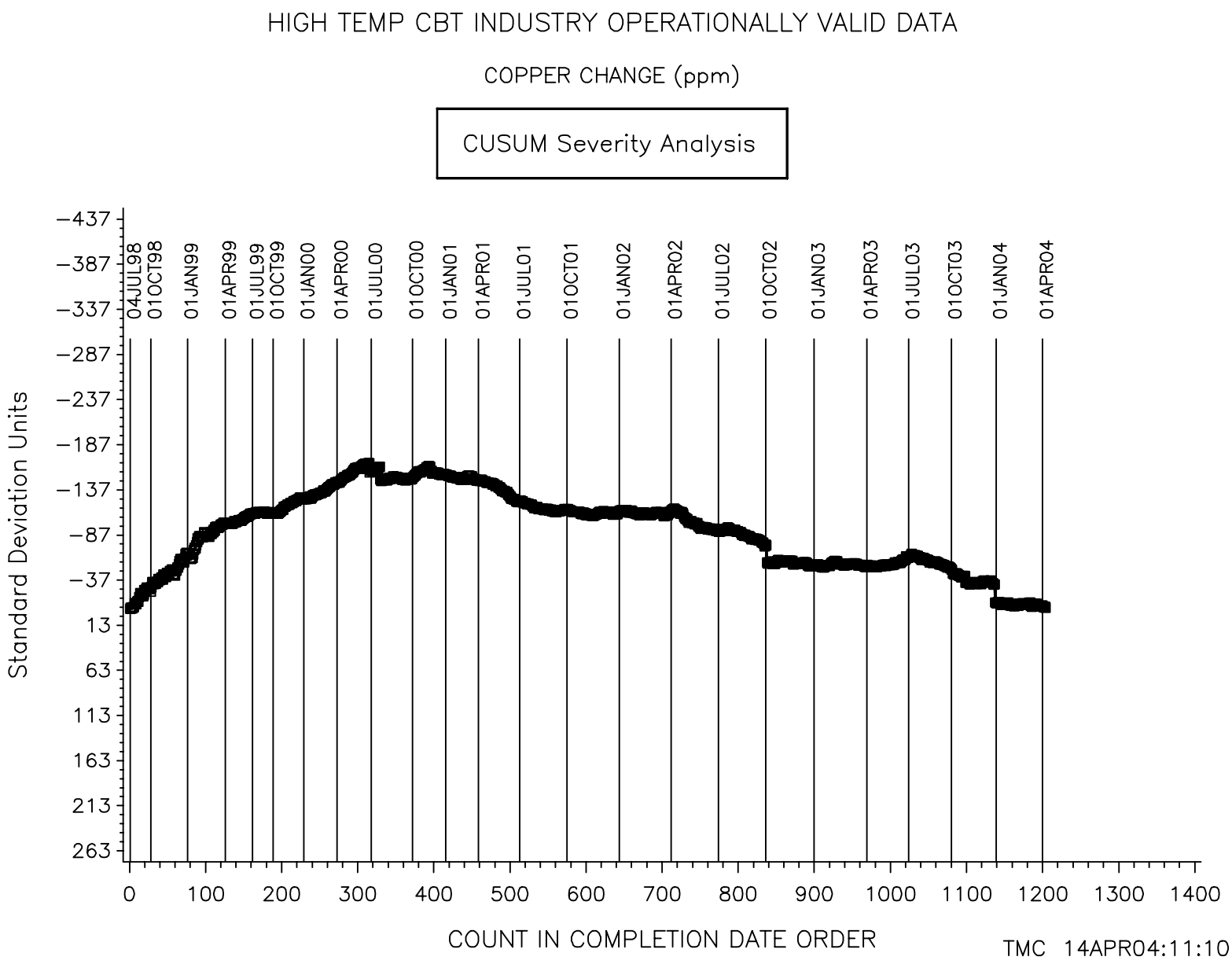
JAC/jac/mem04-029.jac.doc

c: HTCBT Surveillance Panel
J. L. Zalar
F. M. Farber

ftp://ftp.astmtmc.cmu.edu/docs/bench/htcbt/semiannualreports/htcbt-04-2004.pdf

Distribution: Email

Figure 1


HIGH TEMP CBT INDUSTRY OPERATIONALLY VALID DATA
COPPER CHANGE (ppm)
CUSUM Severity Analysis
Standard Deviation Units
−437
−387
−337
−287
−237
−187
−137
−87
−37
13
63
113
163
213
263
04JUL98
01OCT98
01JAN99
01APR99
01JUL99
01OCT99
01JAN00
01APR00
01JUL00
01OCT00
01JAN01
01APR01
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01JAN04
01APR04
0
100
200
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400
500
600
700
800
900
1000
1100
1200
1300
1400
COUNT IN COMPLETION DATE ORDER
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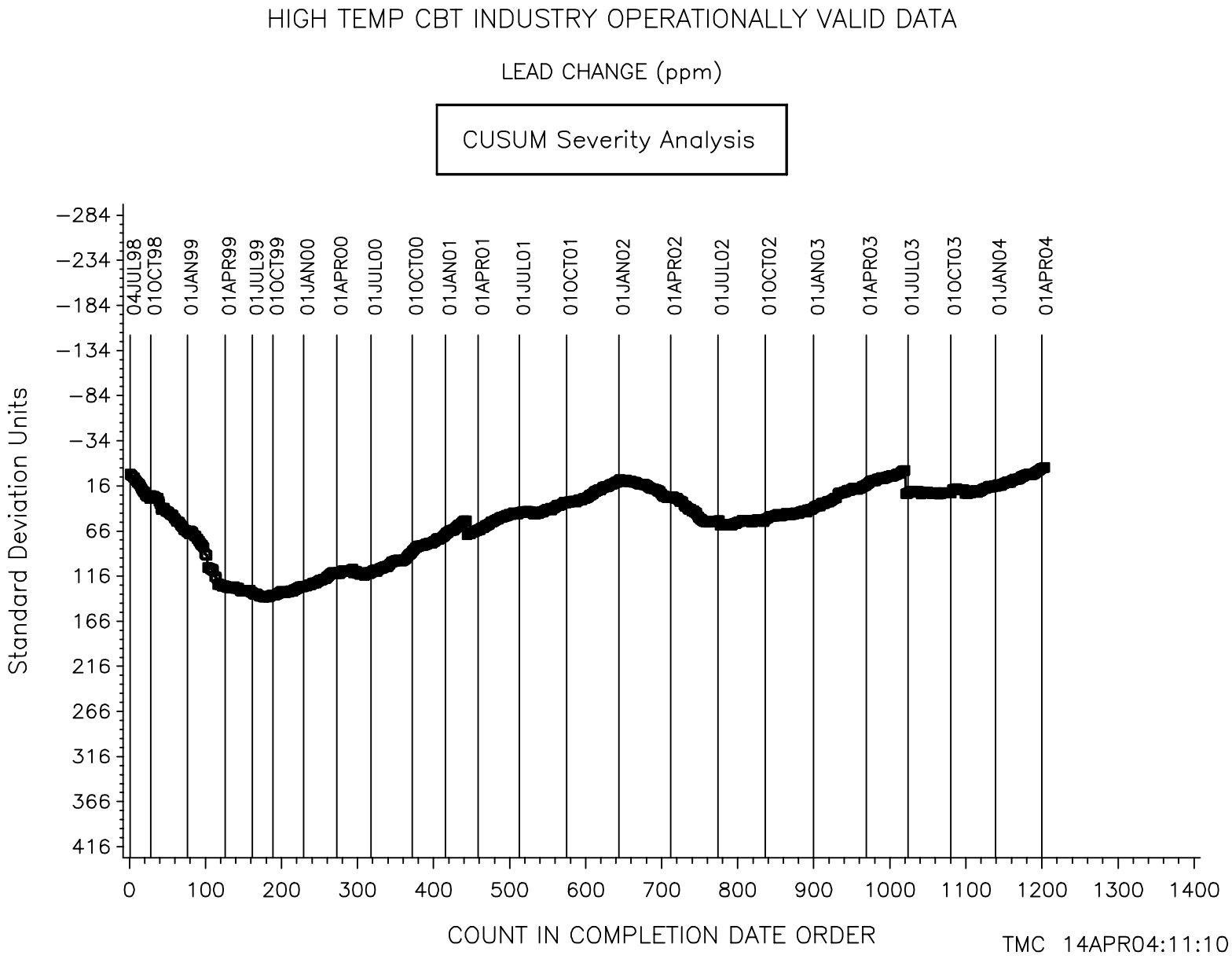
Figure 2


HIGH TEMP CBT INDUSTRY OPERATIONALLY VALID DATA
LEAD CHANGE (ppm)
CUSUM Severity Analysis
Standard Deviation Units
−284
−234
−184
−134
−84
−34
16
66
116
166
216
266
316
366
416
04JUL98
01OCT98
01JAN99
01APR99
01JUL99
01OCT99
01JAN00
01APR00
01JUL00
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1400
COUNT IN COMPLETION DATE ORDER
TMC 14APR04:11:10