Cutler Anderson Architects 135 Parfitt Way SW Bainbridge Island, WA. 98110 (206) 842-4710

January 8, 2002

Post-it® Fax Note 7671	Date 1.14.02	# of pages ▶ 2
To Mike Nuern	From Mason	
Co./Dept	Co.	
Phone #	Phone #	
Fax #	Fax #	

Mike Nuernberger
General Services Administration, Region
400 15th St. SW
Auburn, WA 98001

RE: Oroville / Osoyoos Port of Entry
Construction Phase
Condensation Testing of Roof Assembly

Mike,

Attached is the final report for the roof assembly condensation testing as prepared by Intertek Testing Services. The test report indicates that the proposed system will prevent condensation except in the most severe of conditions. Some minor condensation may occur directly adjacent to the exterior walls under at these times.

The most informative pages of the report are page 3 of 3 in the summary; and, Appendix A graphs "T.C. 4 vs 9" at both –15°C and –25°C. On the graphs you will note that the temperature in markedly warmer on the coated member 1" to the interior of the test assembly. It should also be noted that the test was performed at a relatively high humidity level (45%). We would certainly not expect humidity levels to be maintained at levels anywhere near that high.

The graph "T.C. 4 vs 9 @ –15°C" reflects our extreme design condition. There seems to be an anomoly at the beginning of the test, where the temperature of the coated member dips at the beginning of the test. This dip does not occur at the more extreme "T.C. 4 vs 9 @ –25°C" graph. Ignoring the initial dip, the temperature of the metal ranges from 14°C to 16°C. This temperature is well above the dew point temperature predicted on page 3 of the summary. The low temperature of the dip mentioned above never drops below 10°C. Dew point temperatures are never predicted to be that high on page 3.

We believe that this material should be applied at full thickness on the exterior roof system for a distance of 1200mm from the face of exterior walls. Since this material is applied in significant thickness, it should then be gradually reduced in thickness over the next 1200mm to eliminate any visible lines. At this time we anticipate modifying paint system EFS-1 (see 09900; 3.13;B) in these areas to be:

- Primer as currently specified.
- Pro-Tec "Therm cote / IC"
- Tnemec Eduralume (as currently specified)
- Tnemec Endura-Clear (as currently specified)

We are in the process of verifying compatibility of the Tnemec products with the Thermocote / IC. A primed piece of metal has been delivered to Pro-Tek for immediate application of the Thermocote / IC. It will then be returned to the Tnemec vendor for application of the remaining 2-coats of their product and subsequent review. We will do everything in our power to expedite this process.

Cutler Anderson Architects 135 Parfitt Way SW Bainbridge Island, WA. 98110 (206) 842-4710

Some other comments worth noting:

- The product used in both the initial testing and this testing was the same, as originally sent to Intertek by the manufacturer. Due to the number of coats that Intertek indicated was required to apply the material there was some concern that the material may have been defective. The remaining material was returned to the vendor for verification. The vendor indicated that the product was correct and not defective. Apparently Intertek simply "hard-brushed" the product, thus applying many more coats than the product required.
- I have verified with the manufacturer that the number of coats used will in no way affect the performance of the material since the correct thickness was achieved.

Assuming that the Tnemec and Pro-Tek coating products are compatible, we please review and provide direction for our action.

If you have any question, please call.

Sincerely,
CUTLER ANDERSON ARCHITECTS

Pat Munter

Attachment: Intertek Testing Services report titled "Temperature Conduction Comparison Test," dated December 18, 2001.

cc DEWANDA, HBM

Test Report

ITS Intertek Testing Services
ETL SEMKO

Intertek Testing Services
ETL SEMKO

REPORT OF: Temperature Conduction Comparison Test

AT: Coquitlam Laboratory

DATE: Dec. 14, 2001
REVISED DATE: Dec. 18, 2001

PROJECT: 481-2127 / 3015886

REPORTED TO: Meiklejohn Bevanda Meiklejohn Architects Inc.
233 Bernard Street
Kelowna, BC V2A 5B4

Attention: Mr. Nick Bevanda

INTRODUCTION

Intertek Testing Services NA Ltd./Warnock Hersey has conducted a Temperature Conduction Comparison Test on a coating submitted to our laboratory by Meiklejohn Bevanda Meiklejohn Architects Inc..

PRODUCT DESCRIPTION

Thermocote/IC™ ,an elastomeric acrylic ceramic reflective insulation, manufactured by ProTek-USA.

TEST SET UP

Two 6" x 6" x 3/8" angle iron pieces were installed through a 2" x 6" wood stud wall, 2' of angle iron protruded from each side of the wall. The wall was insulated with fiberglass R20 insulation and sheeted with 1/2" plywood on each side. The mock wall test assembly was then mounted in the doorway of a cold chamber with 2 of the angle iron pieces into the cold chamber while the other 2 pieces faced into the laboratory. One of the 2 pieces, on the cold side of the test wall, was coated with Thermocote/IC™ to an average thickness of 13 mil. It took 4 coats, applied by brushing, to achieve this thickness. The thickness was determined by an average of readings taken at 3 pre-determined places on the angle iron.

TEST RESULTS
The following equipment was utilized for testing:

- Cold Chamber I.D.# 04583
- Fluke Data Bucket s/n 6729309
- Hand held temperature readout s/n V2310101
- Hand held probe s/n V2920010

Readings, from the 10 thermocouples, were taken every 12 minutes.

The cold chamber was set to 25°C and operated for 6 hours, condensation, on both the coated and uncoated angle iron, was noted approximately 2 hours into the test, the test was continued for an additional 4 hours at which time small beads of water formed on both the coated and uncoated pieces of angle iron. Temperature on warm side was 16 ° C with a RH reading of 44%.

The temperature in the cold chamber was then raised to –15°C for a period of 16-1/2 hours at which time a very small amount of condensation was noted on both the coated and uncoated pieces of angle iron. Temperature on warm side was 18° C with an RH reading of 45%.

A total of 10 thermocouples (5 on each) were placed on the angle iron. The thermocouples were placed as follows:

Uncoated Angle	Coated Angle	Thermocouple Placement
TC # 1	TC # 6	on angle 1" from end of angle on cold side
TC # 2	TC # 7	on angle 1" from plywood sheeting on cold side
TC # 3	TC # 8	on angle in middle of stud wall
TC # 4	TC # 9	on angle 1" from plywood sheeting on warm side
TC # 5	TC # 10	on angle 1" from end of angle on warm side

Test Temp. -15 C

T.C. #	Average Test Temperature
1	*-15.1 C*
6 coated angle	-15.1 C
2	*-9.4 C*
7 coated angle	-10.1 C
3	*-2.0 C*
8 coated angle	-2.3 C
4	*5.4 C*
9 coated angle	14.5 C
5	*15.5 C*
10 coated angle	15.3 C

Test Temp. -25 C

T.C. #	Average Test Temperature
1	*-23.9 C*
6 coated angle	-23.8 C
2	*-16.4 C*
7 coated angle	-17.2 C
3	*-7.0 C*
8 coated angle	-7.3 C
4	*2.0 C*
9 coated angle	16.4 C
5	*13.9 C*
10 coated angle	13.8 C

See Appendix A for graphs of the different thermocouples at the 2 test temperatures and Appendix B for test set up.

TEST RESULTS - ***continued***

Warm Side Temperature	Relative Humidity	Dew Point Temperatures
21 ° C	25 %	0 ° C
21 ° C	30 %	3 ° C
21 ° C	35 %	5 ° C
21 ° C	40 %	6.5 ° C
23 ° C	25 %	2 ° C
23 ° C	30 %	4 ° C
23 ° C	35 %	7 ° C
23 ° C	40 %	8.5 ° C

DEFINITION OF DEW POINT TEMPERATURE

This is the temperature below which moisture will condense out of air. Air that is holding as much water vapour as possible is saturated or at its dew point. Water will condense on a surface that is below the dew point temperature of the air.

INTERTEK TESTING SERVICES NA LTD.
Warnock Hersey

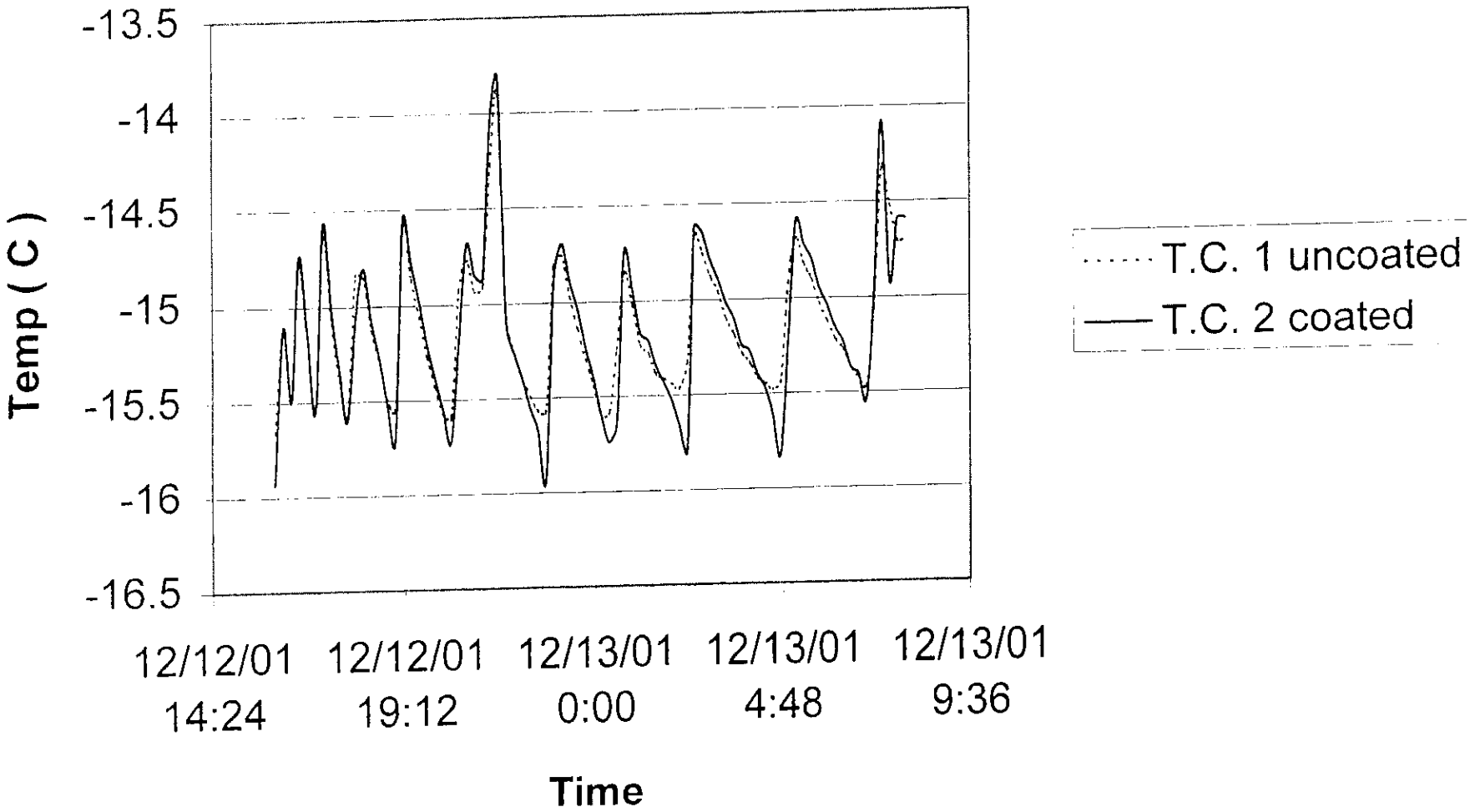
Reported by: Dave Rowlandson
Dave Rowlandson
Technician, Building Materials

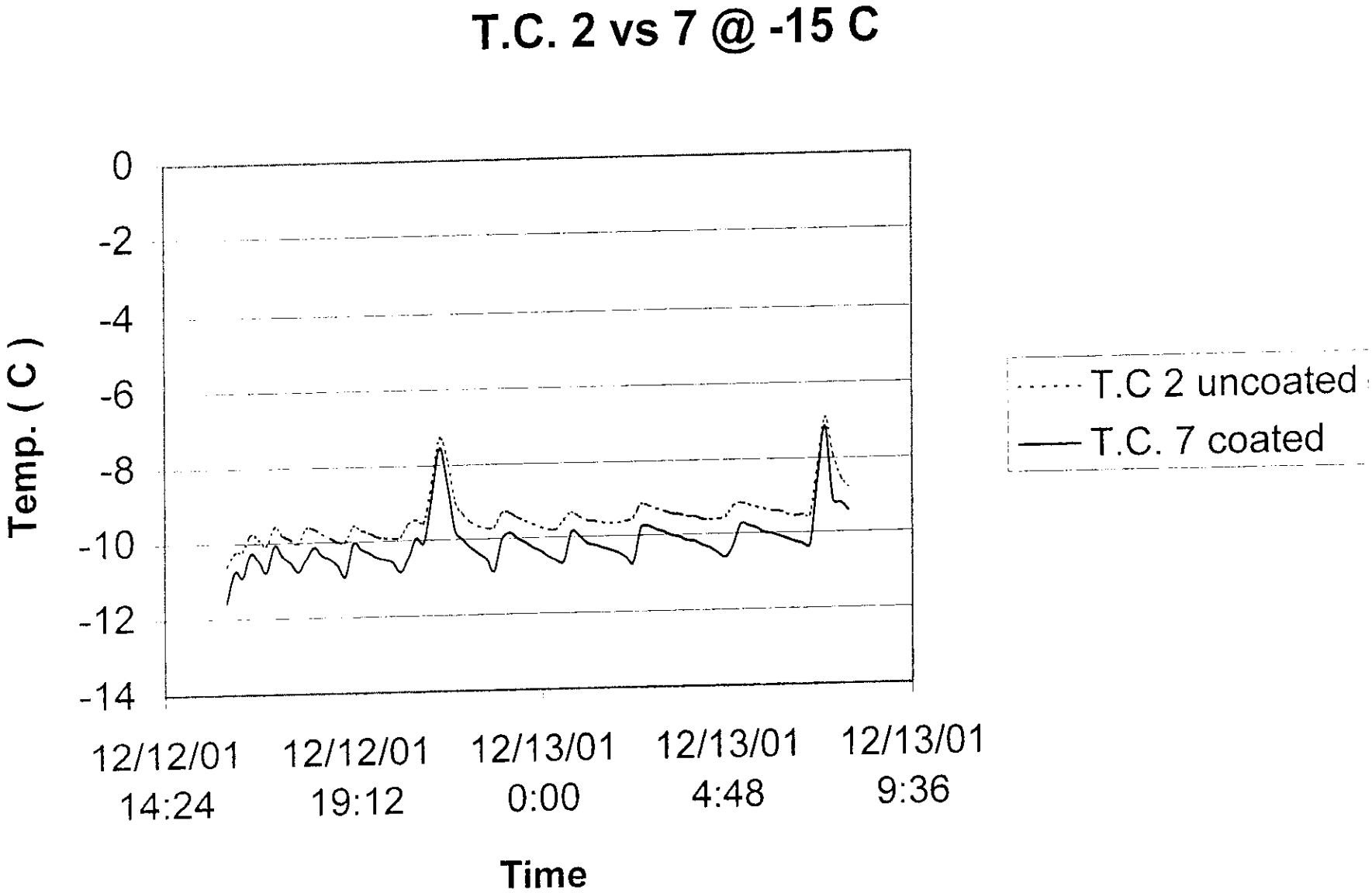
Reviewed by:
Cam Robinson, P. Eng.
Manager, Construction Products

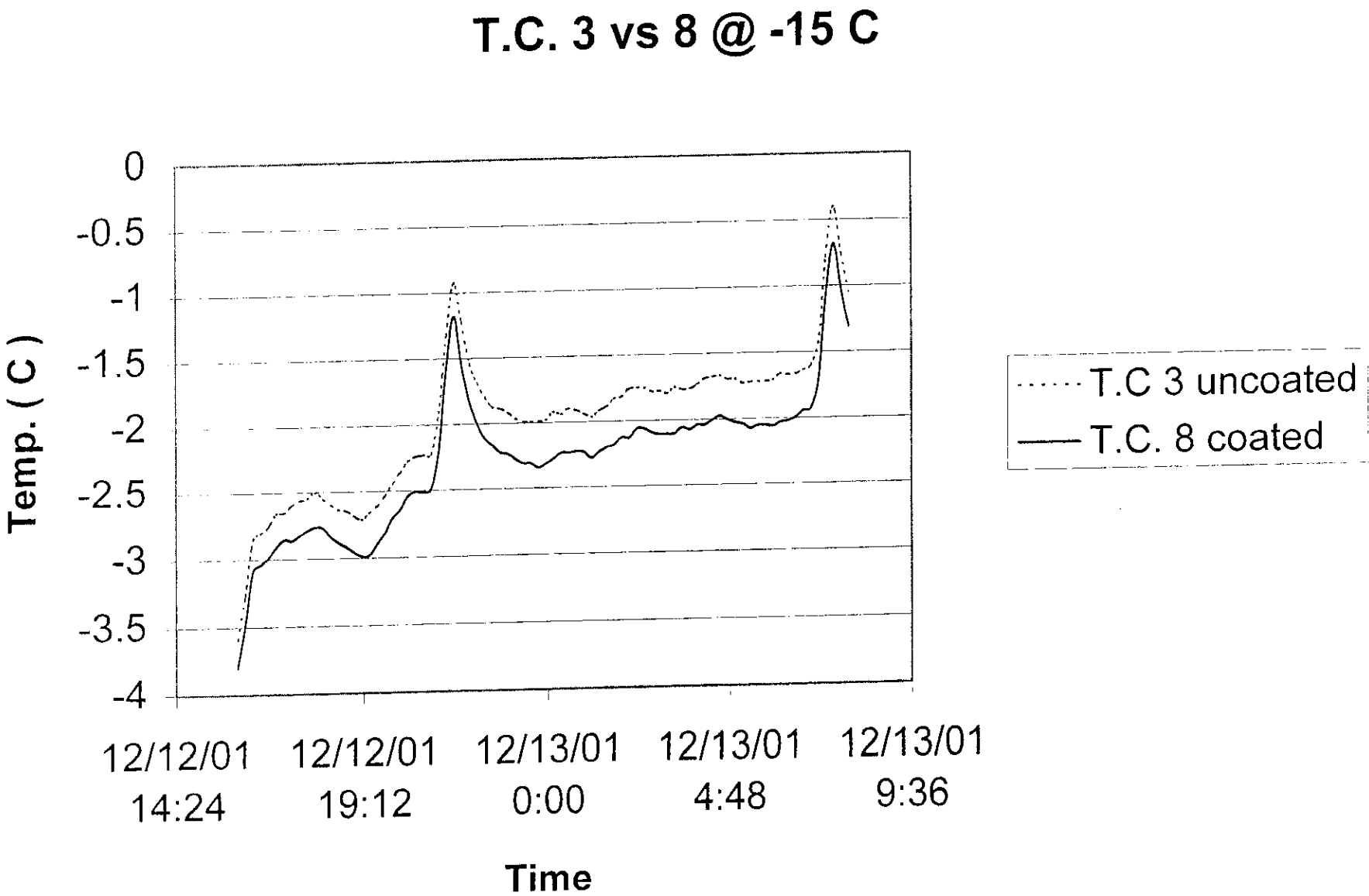
DR/lrh

APPENDIX A

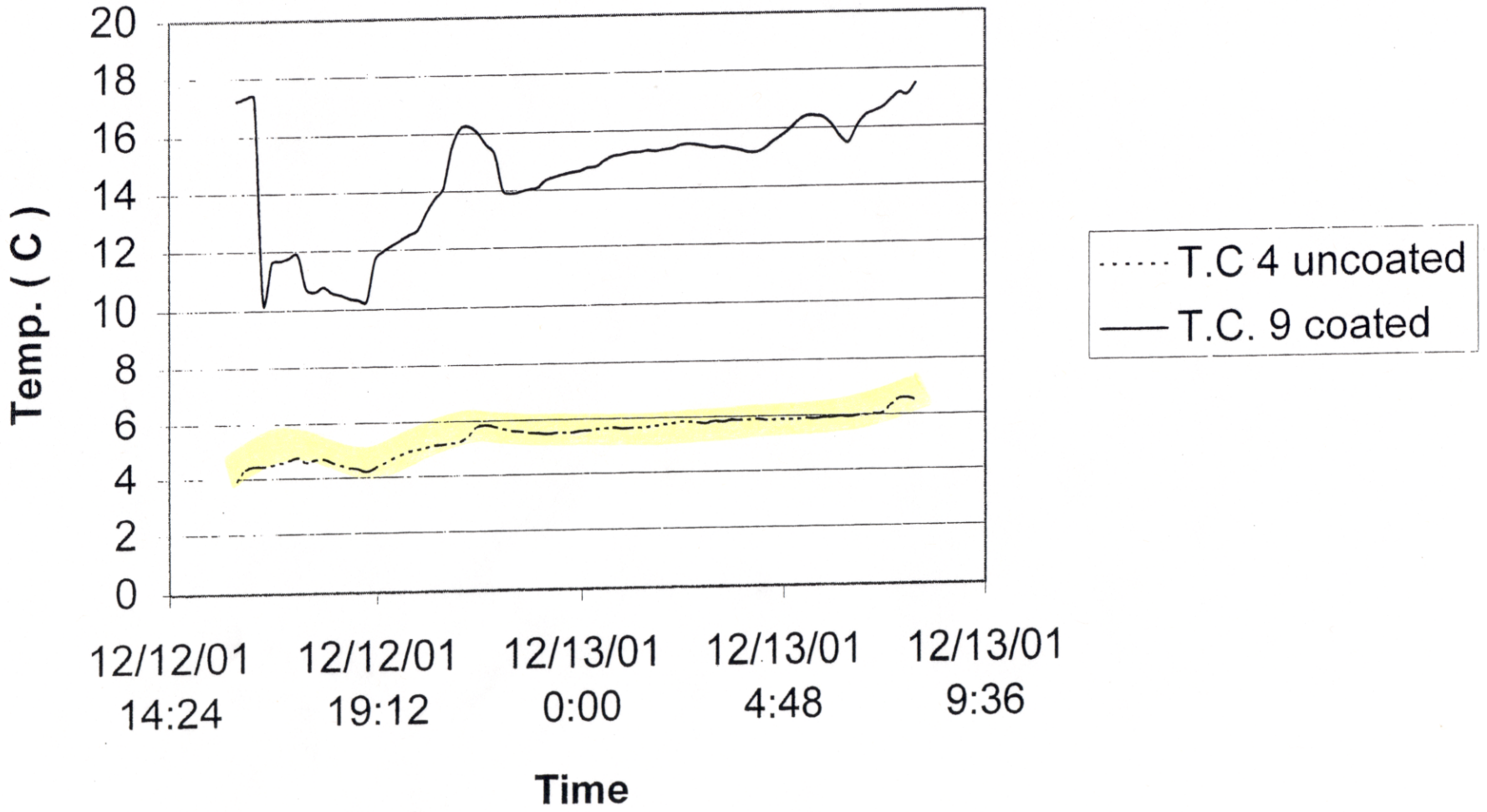
T.C. 1 vs 6 @ -15 C


-13.5
-14
-14.5
-15
-15.5
-16
-16.5
Temp (C)
12/12/01 14:24
12/12/01 19:12
12/13/01 0:00
12/13/01 4:48
12/13/01 9:36
Time
T.C. 1 uncoated
T.C. 2 coated

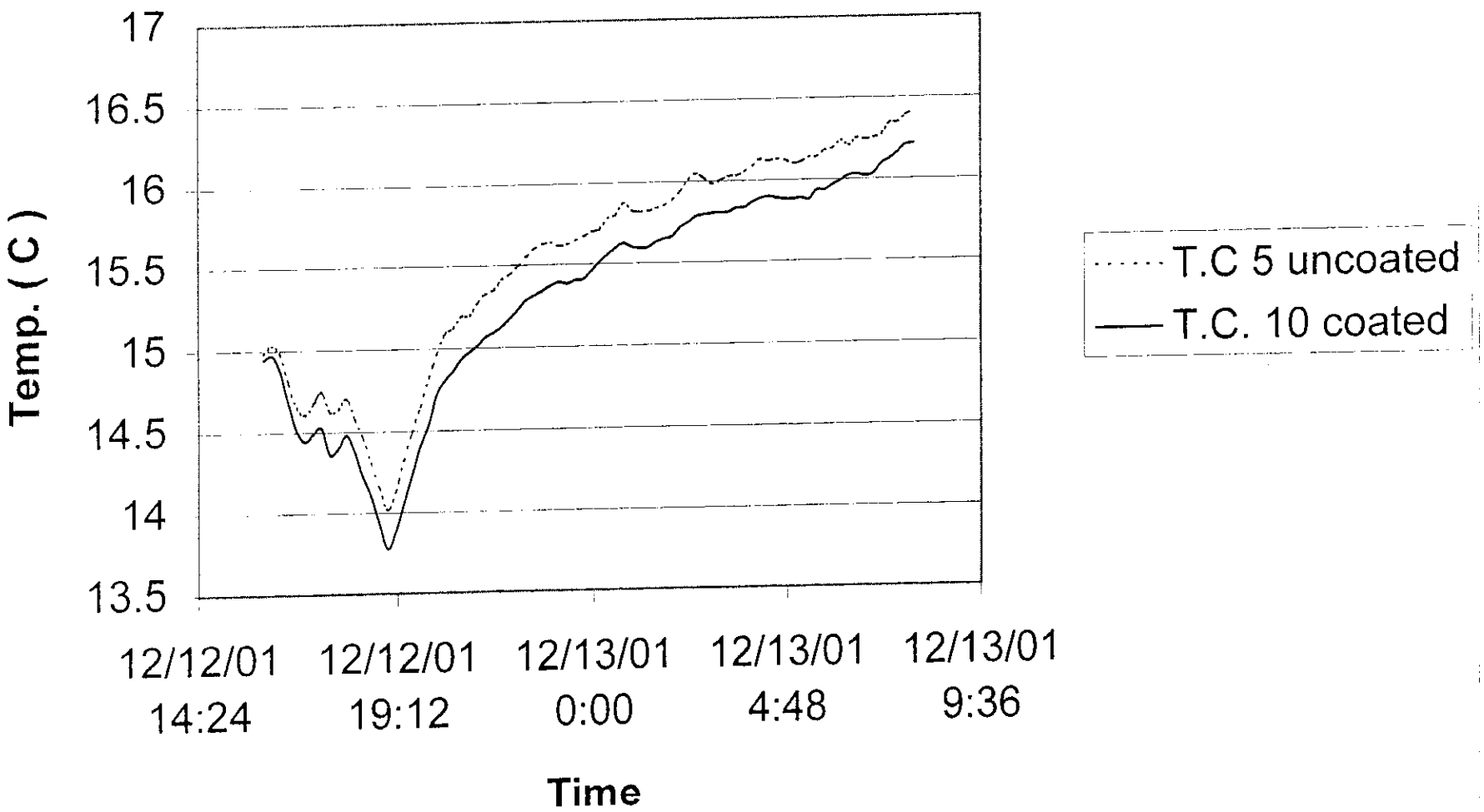

T.C. 2 vs 7 @ -15 C
Temp. (C)
0
-2
-4
-6
-8
-10
-12
-14
12/12/01 14:24
12/12/01 19:12
12/13/01 0:00
12/13/01 4:48
12/13/01 9:36
Time
T.C 2 uncoated
T.C. 7 coated

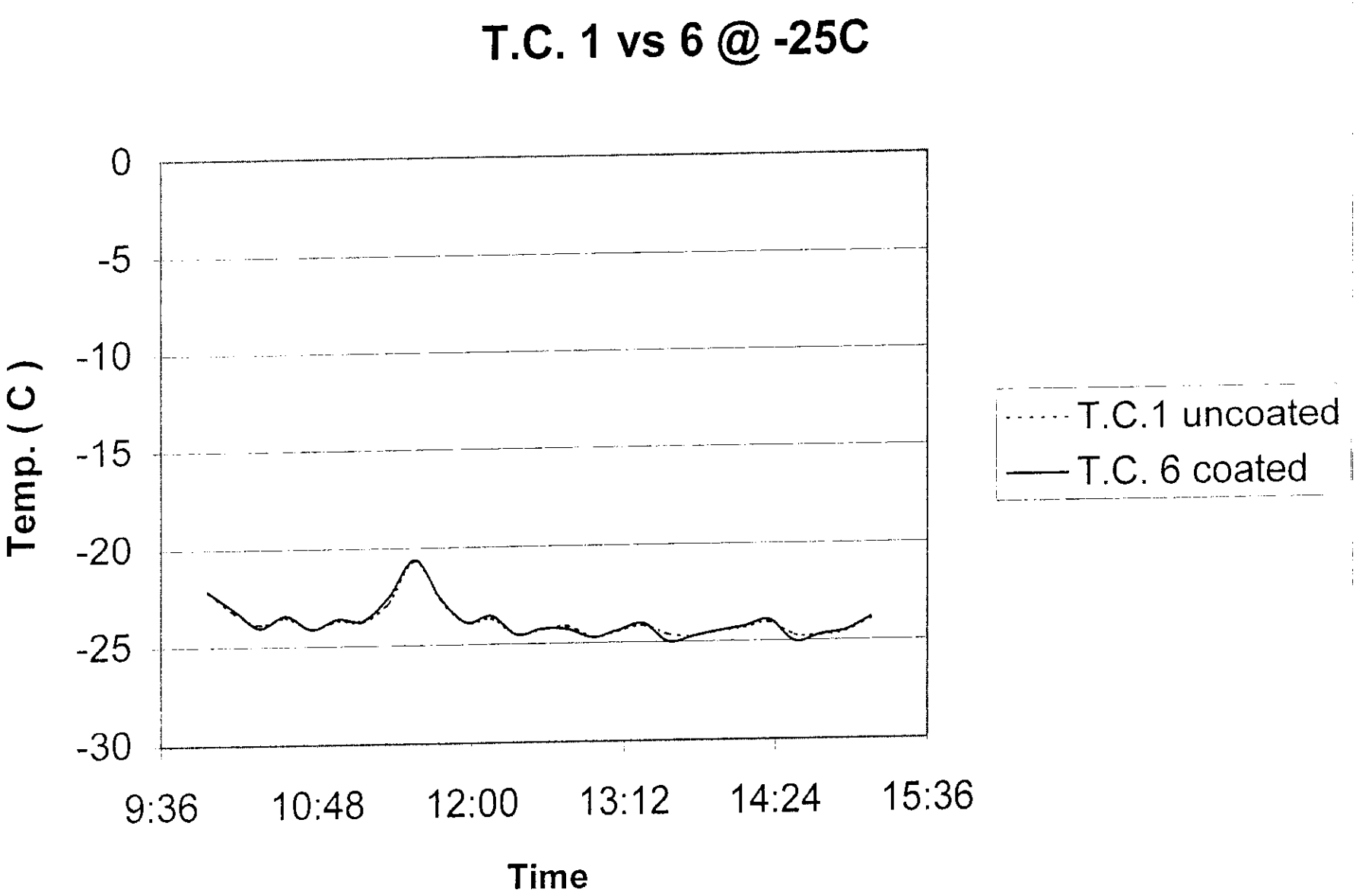

T.C. 3 vs 8 @ -15 C
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
Temp. (C)
12/12/01 14:24
12/12/01 19:12
12/13/01 0:00
12/13/01 4:48
12/13/01 9:36
Time
T.C 3 uncoated
T.C. 8 coated

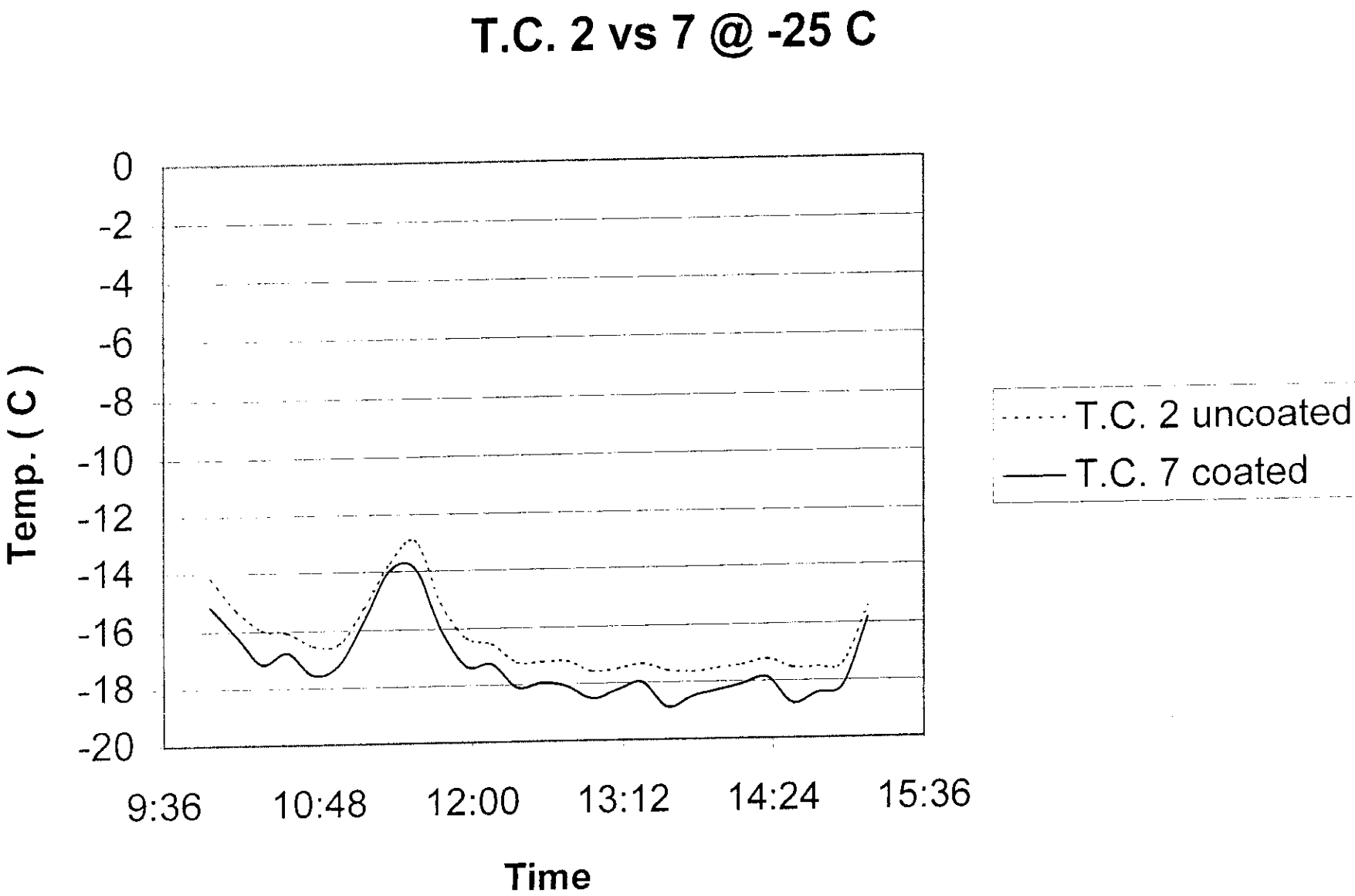
T.C. 4 vs 9 @ -15 C

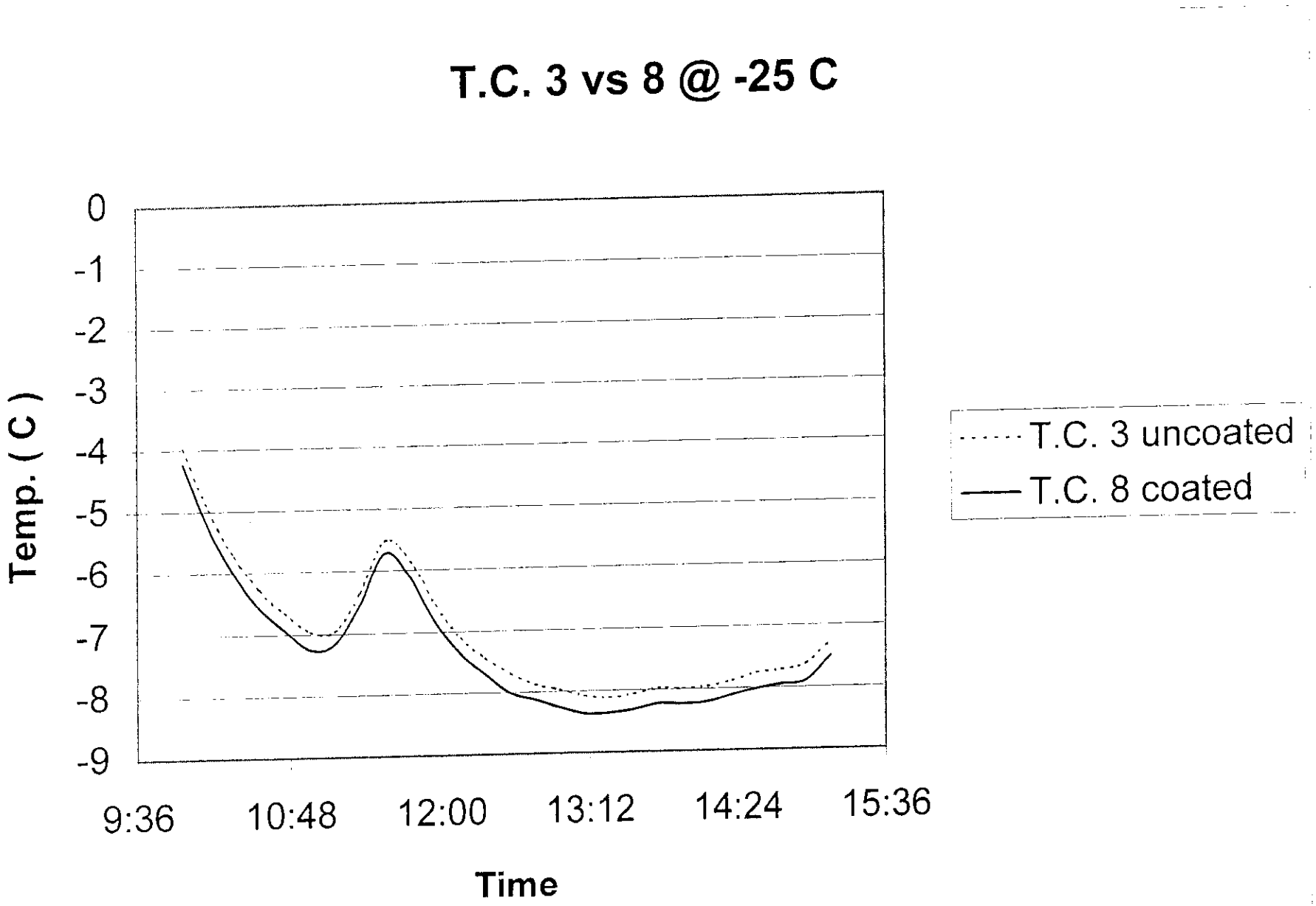

Temp. (C)
20
18
16
14
12
10
8
6
4
2
0
12/12/01 14:24
12/12/01 19:12
12/13/01 0:00
12/13/01 4:48
12/13/01 9:36
Time
T.C 4 uncoated
T.C. 9 coated

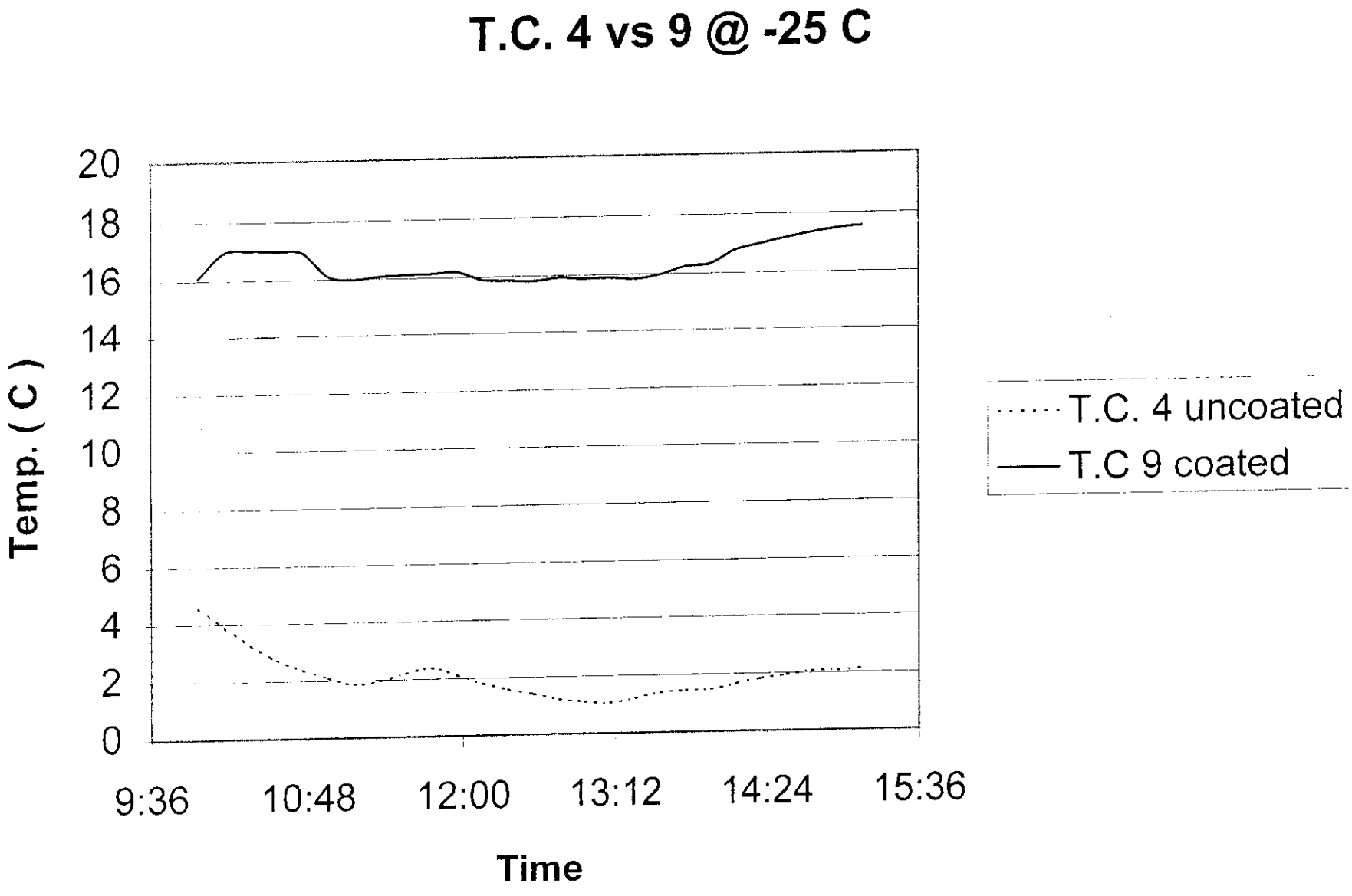
T.C. 5 vs 10 @ -15 C


17
16.5
16
15.5
15
14.5
14
13.5
Temp. (C)
12/12/01 14:24
12/12/01 19:12
12/13/01 0:00
12/13/01 4:48
12/13/01 9:36
Time
T.C 5 uncoated
T.C. 10 coated

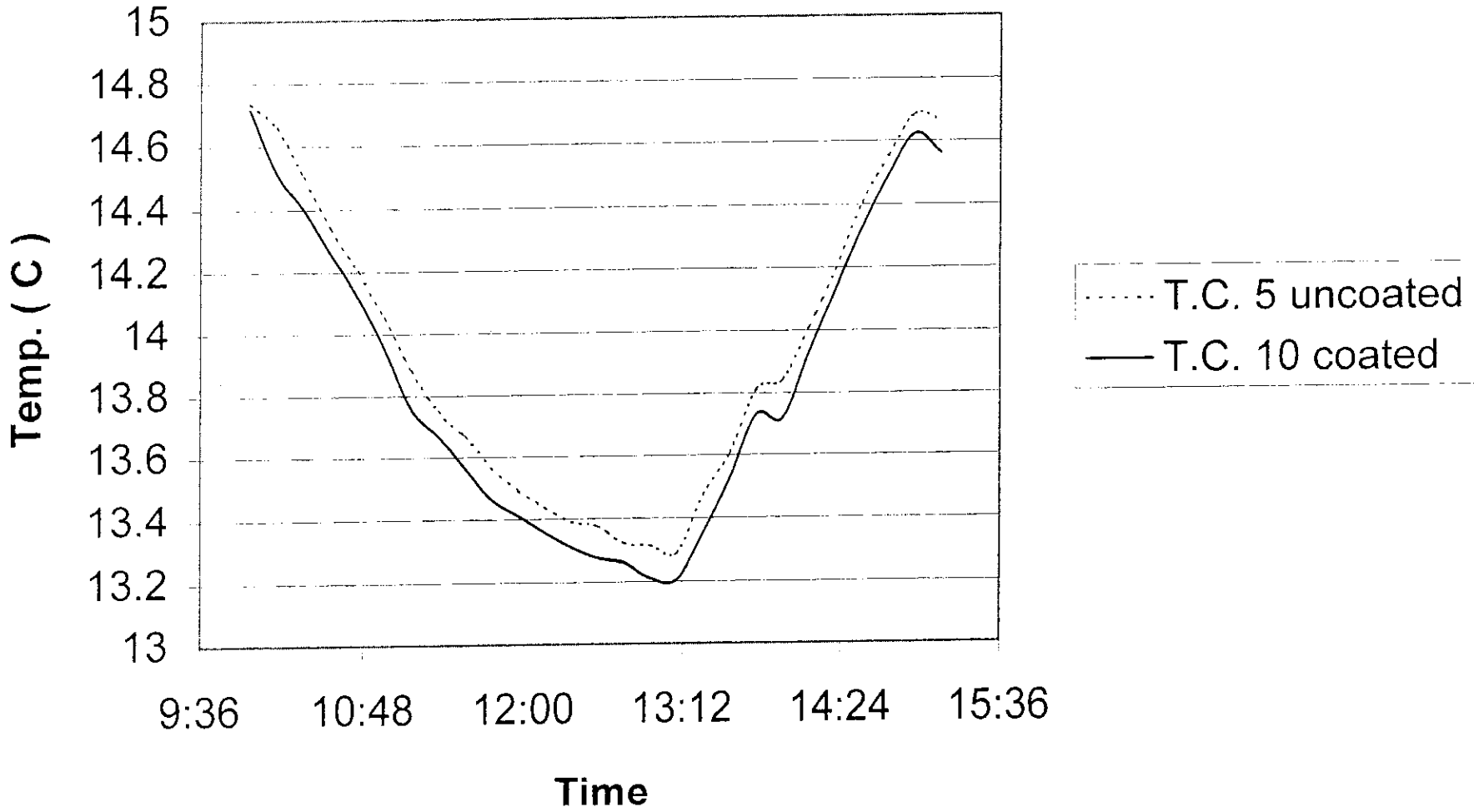

T.C. 1 vs 6 @ -25C
0
-5
-10
-15
-20
-25
-30
Temp. (C)
9:36
10:48
12:00
13:12
14:24
15:36
Time
T.C.1 uncoated
T.C. 6 coated


T.C. 2 vs 7 @ -25 C
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
Temp. (C)
9:36
10:48
12:00
13:12
14:24
15:36
Time
T.C. 2 uncoated
T.C. 7 coated

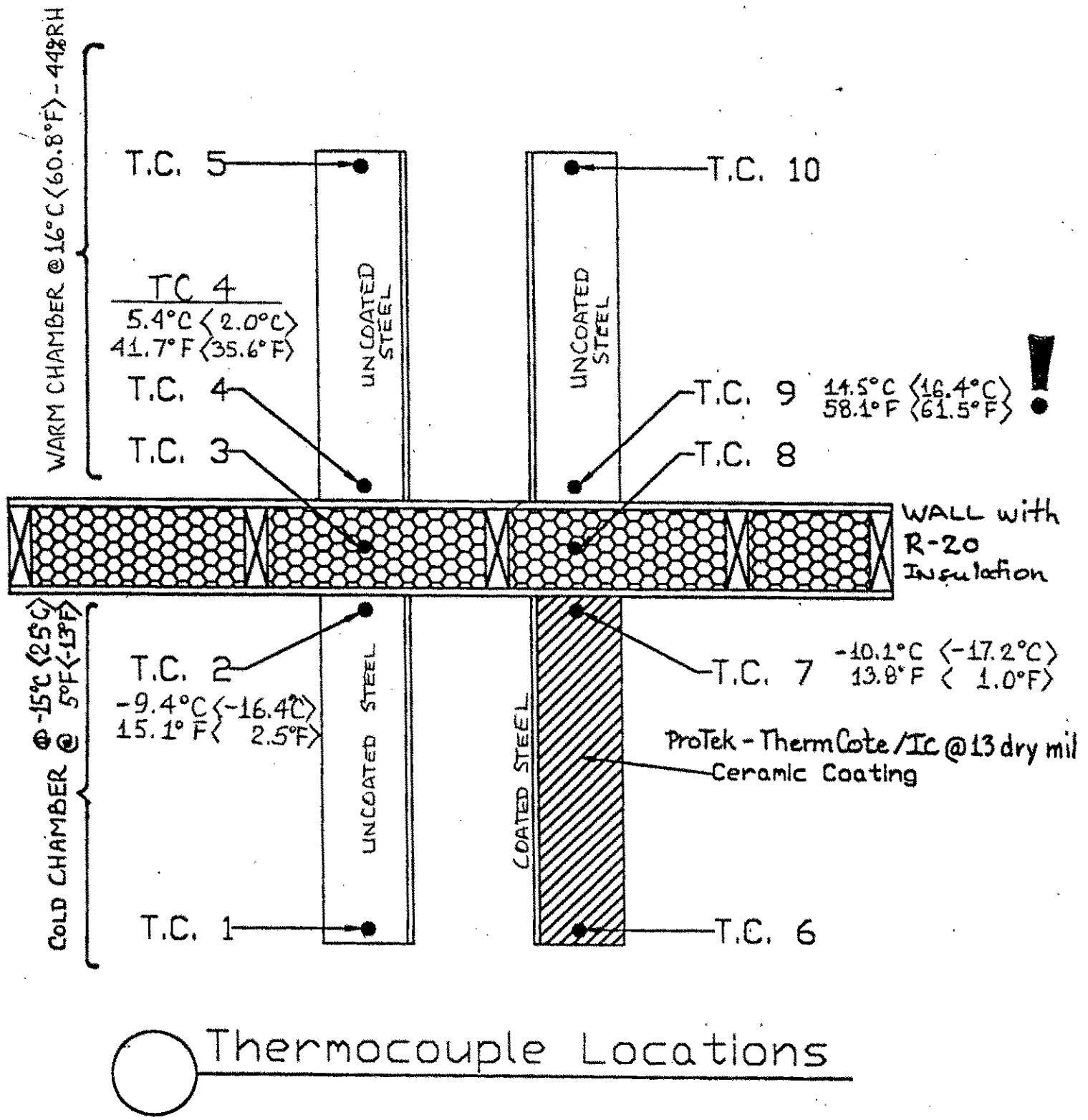

T.C. 3 vs 8 @ -25 C
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
Temp. (C)
9:36
10:48
12:00
13:12
14:24
15:36
Time
T.C. 3 uncoated
T.C. 8 coated


T.C. 4 vs 9 @ -25 C
Temp. (C)
20
18
16
14
12
10
8
6
4
2
0
9:36
10:48
12:00
13:12
14:24
15:36
Time
T.C. 4 uncoated
T.C 9 coated

T.C. 5 vs 10 @ -25 C


15
14.8
14.6
14.4
14.2
14
13.8
13.6
13.4
13.2
13
Temp. (C)
9:36
10:48
12:00
13:12
14:24
15:36
Time
T.C. 5 uncoated
T.C. 10 coated

APPENDIX B



Thermocouple Locations