REPORT NO. M-6855C-2

WELD COUPON HEAT-AFFECT ZONE HARDNESS SURVEY

POWER AUTHORITY OF THE
STATE OF NEW YORK

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Lucius Pitkin
INCORPORATED
EST 1885
Metallurgical and Chemical Consultants
Testing Laboratories–Nondestructive Examination Services
50 HUDSON STREET, NEW YORK, N.Y. 10013 · (212) 233-2737
TELEX 12-6615 · CABLE NIKTIP (212) 233-2558

REPORT

September 28, 1982
L.P. No. M-6855C-2

Your P.O. NYO-82-105
OEAR234767

Power Authority of the State of New York
123 Main Street
White Plains, New York

Subject: WELD COUPON HEAT-AFFECT ZONE
HARDNESS SURVEY
SA 302B TO SA 302B
E 8018C3

A weld coupon measuring 3-1/2 in. wide x 3-1/2 in. thick x 18 in. long was submitted to Lucius Pitkin, Inc. for heat treating and hardness testing. We were advised that the submitted weld coupon had been cut from a welded plate measuring 24 in. x 24 in. x 3-1/2 in. thick. We were further advised that the base material, SA 302B, was welded with an E 8018C3 rod at a 100F preheat.

Prior to welding, the base material had been normalized at 1650 ±25F for 5 hrs.; water quenched; tempered at 1225 ±25F for 5 hrs.; air cooled and stress relieved at 1125 ±25F for 30 hrs. and air cooled.

As received, the weld coupon exhibited a 1-inch deep crack in the heat-affected zone which had initiated on the crown side of the weld. The crack appeared to be present along the entire length of the weld. Fig. 1 is a close-up photograph showing the heat-affected zone crack.

One-inch thick specimens were cut transverse to the weld in preparation for heat treating and hardness testing. Transverse specimens were heat treated in accordance with the following schedule:

Specimen No.	Heat Treatment
AW	As-welded
800	800 F - 30 hrs., air cooled
900	900 F - 30 hrs., air cooled
1000	1000 F - 30 hrs., air cooled
1100	1100 F - 30 hrs., air cooled
1200	1200 F - 30 hrs., air cooled

Each of the specimens were carefully wet ground and etched after heat treating. Fig. 2 is a photomacrograph showing the etched specimens.

Four hardness traverses were performed across the heat-affected zone on each specimen using the Rockwell 30N scale. The 30N hardness values were converted to the Rockwell C scale and the maximum heat-affected zone hardness for each traverse plotted as a function of temperature. Fig. 3 is a sketch showing the location of the hardness traverses. Fig. 4 is a curve showing the maximum heat-affected zone hardness for each of the hardness traverses as a function of temperature as compared to the as-welded, heat-affected zone hardness.

* * *

Results of the heat-affected zone hardness survey indicate the maximum heat-affected zone hardness to be essentially the same as the as-welded hardness for stress relief temperatures of 800, 900 and 1000 F. A significant decrease in maximum heat-affected zone hardness was observed at 1100 and 1200 F.

It was also observed that the heat-affected zone hardness exhibited by the crown and root side weld hardness traverses were slightly higher than the heat-affected zone hardness of the mid-thickness traverses.

Respectfully submitted,

LUCIUS PITKIN, INC.

A. J. Vecchio
Vice President &
Asst. Chief Metallurgist

AJV/mm/4

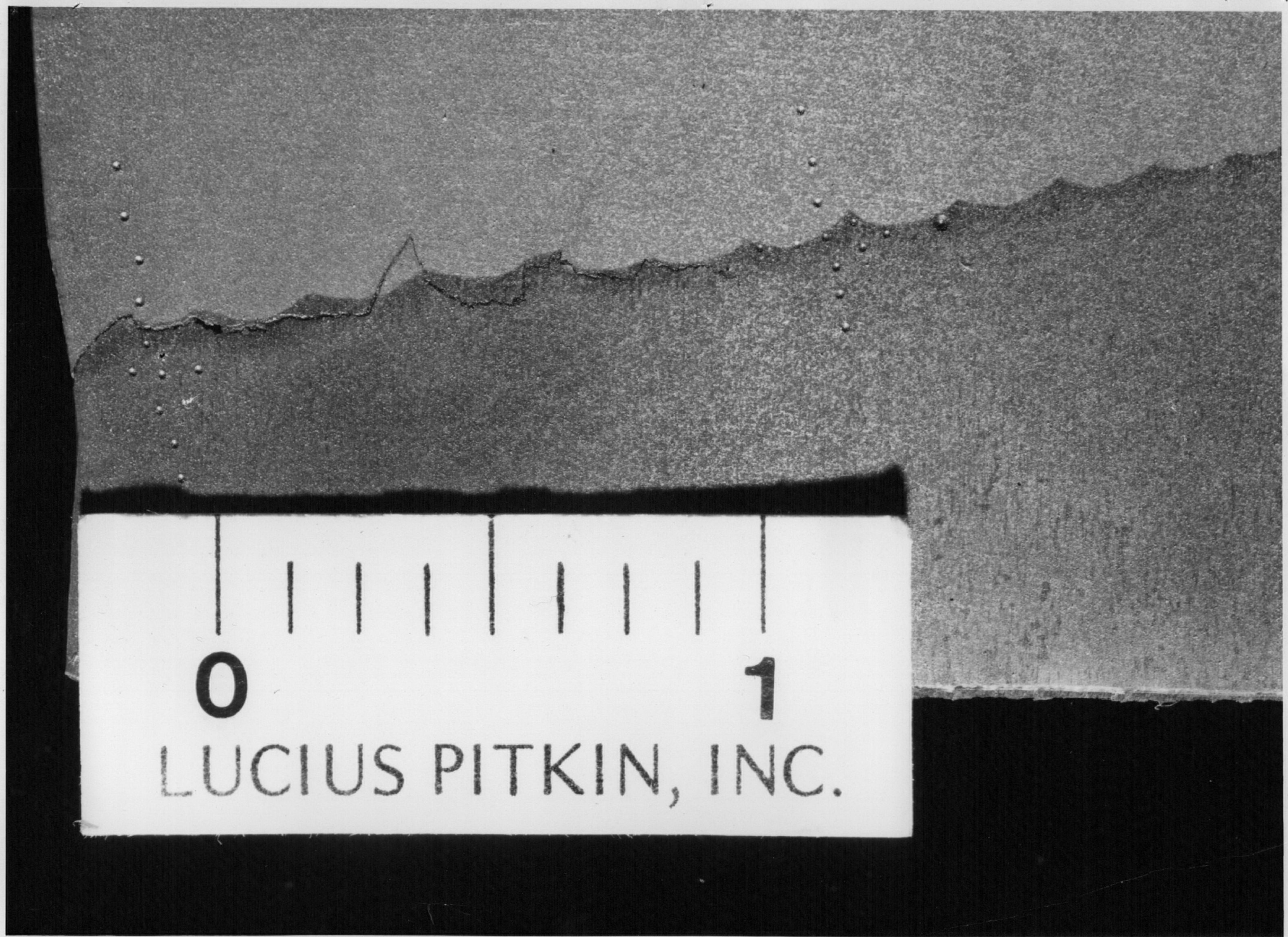


Fig.1

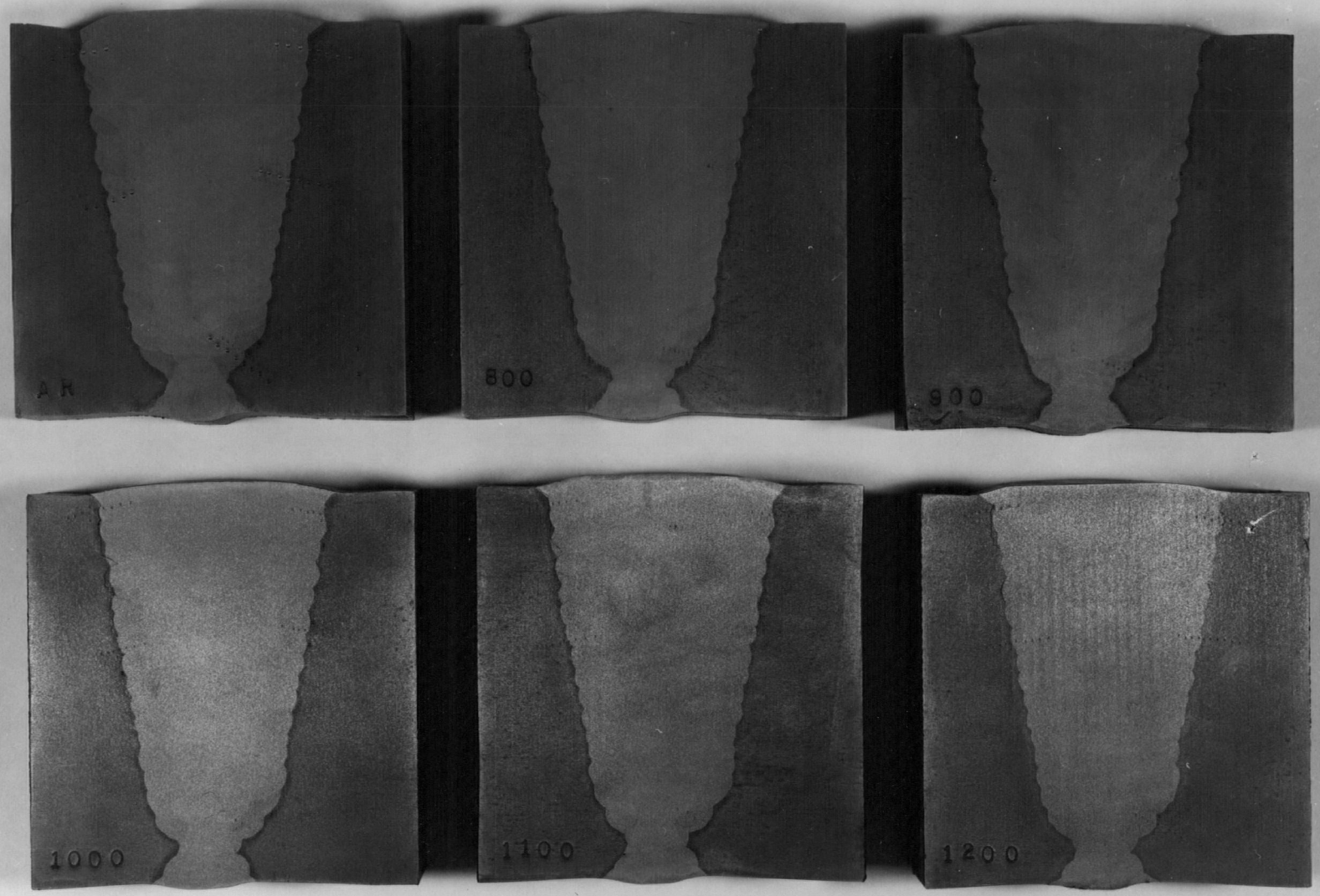


Fig.2

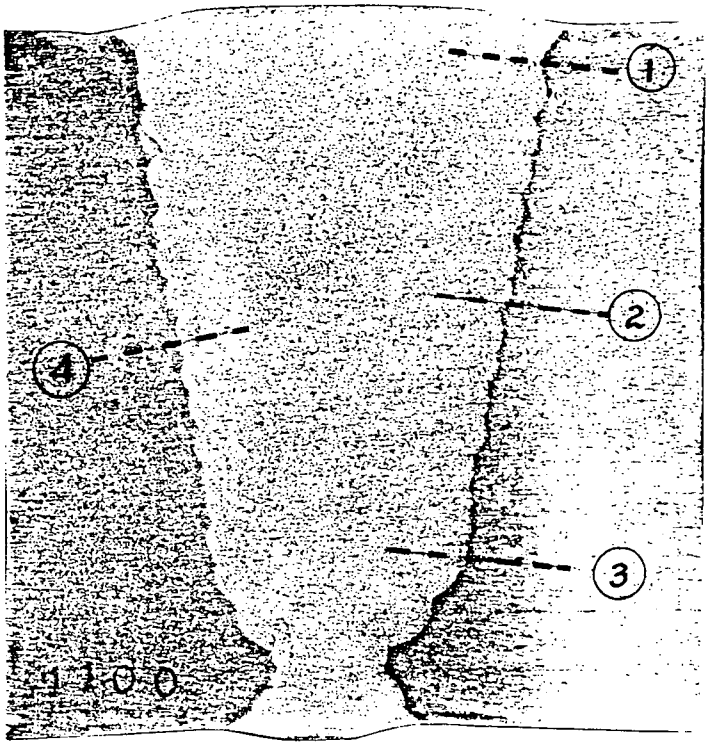


Fig. 3 LOCATION OF ROCKWELL 30N HARDNESS TRAVERSES PERFORMED ON GROUND TRANSVERSE WELD SPECIMENS

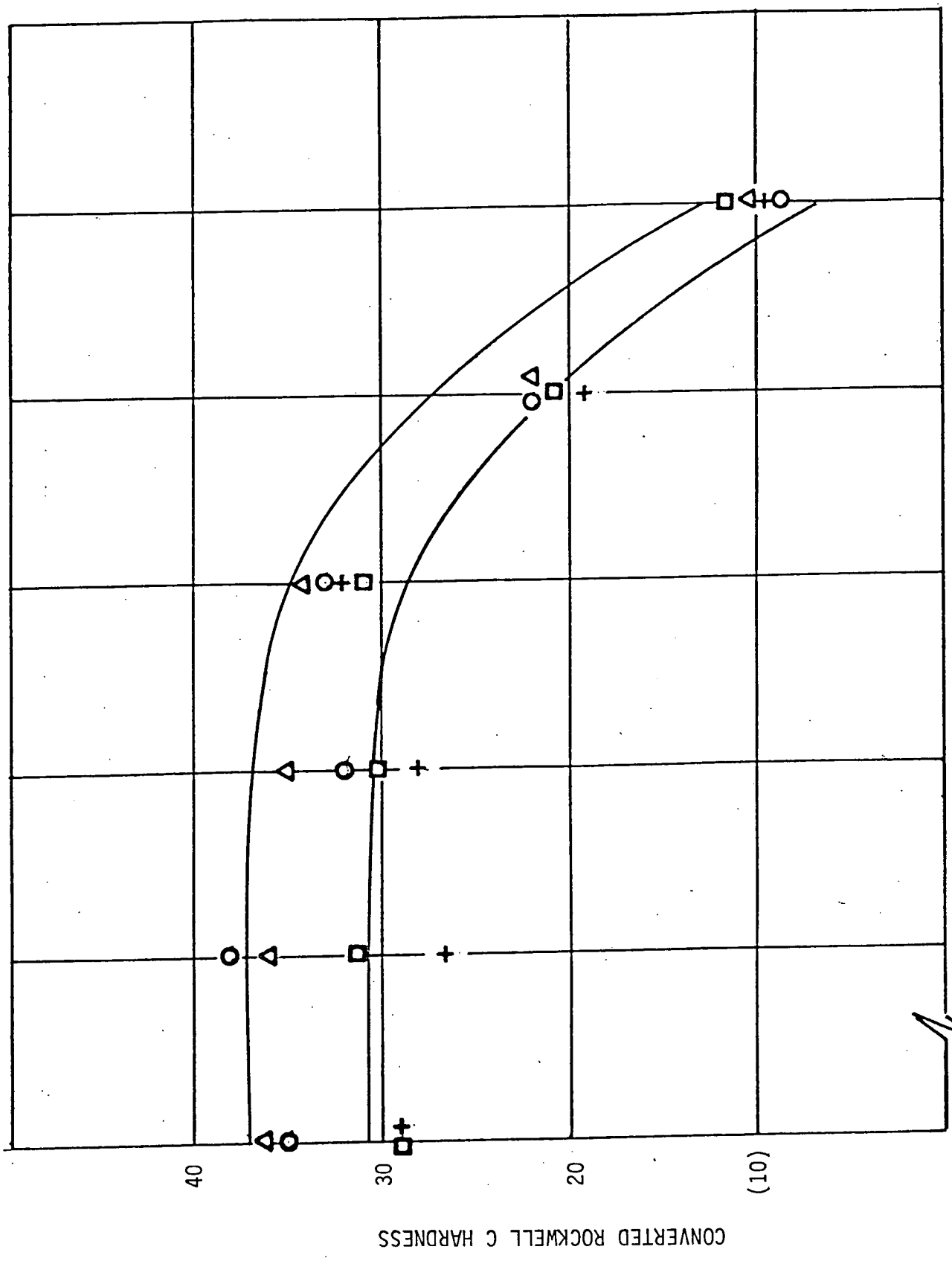
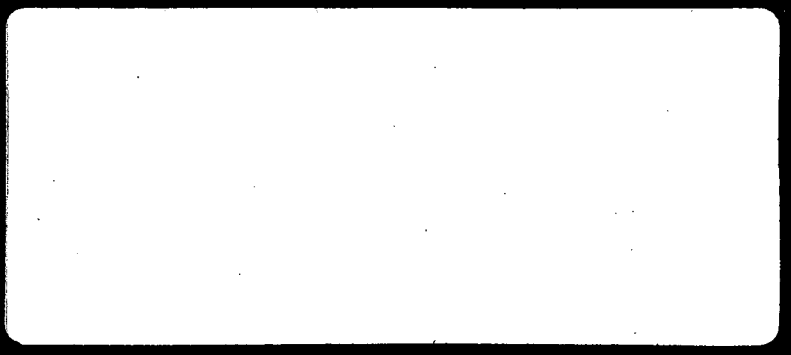


Fig. 4 MAXIMUM HEAT-AFFECTED ZONE HARDNESS AS A FUNCTION OF TEMPERATURE



Metallurgical and Chemical Consultants

Nondestructive Examination Services

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