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Report No. P316/21-1
Watertown Arsenal

June 6, 1935

2nd Report on Gas Welded 18/8

Object

To make a metallographic study of gas welded 18/8.

Conclusions

The welding was of poor quality, considerable carbide pick up occurring and slight porosity being found. Cracks were also present. Heat treatment at 1950°F redissolved the precipitated carbides in the heat affected zone, but did not remove the carbides from the weld metal. The carbides in the weld metal were starting to diffuse into the metal. The weld metal would be liable to corrosion.

Material

Acetylene welded 18/8 sheet similar to that supplied for test described in report P316/21 was supplied in the form of an expansion joint.

The expansion joint was annealed at 1950°C for twenty minutes, pickled first electrolytically in an alkaline bath, then in an HCl + HNO_3 pickle bath at room temperature.

Metallographic Study

On Figures 1 and 2 are shown the structure of the welded joint. The weld tends to be porous near the surface. Small cracks are present. Considerable carbon pick up occurred. Carbides precipitated out in the heat affected zone about 1/2 cm from the weld.

Heat treatment redissolved the precipitated carbides and caused diffusion of the carbides in the weld metal to occur. The presence of these carbides in the weld would cause the weld to be liable to corrosion. To completely dissolve the carbides in the weld metal would require considerable time or higher temperatures which would be detrimental to the metal.

Respectfully submitted,

P. R. Kosting

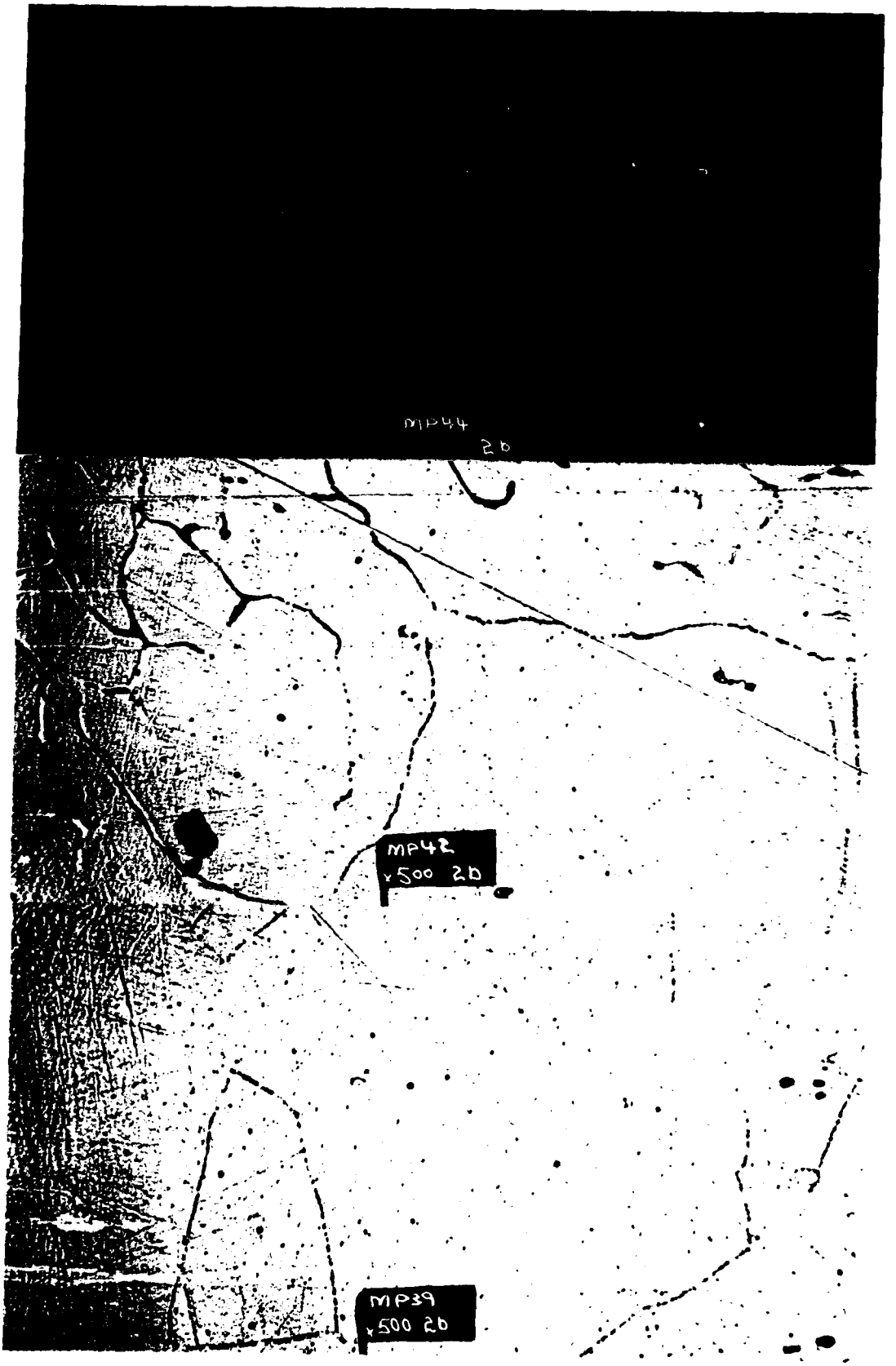

Figure 1. Gas welded 18/8 sheet showing porosity in weld, carbides in weld metal (upper left MP42) penetrating original sheet metal, and carbide precipitation in heat affected zone.

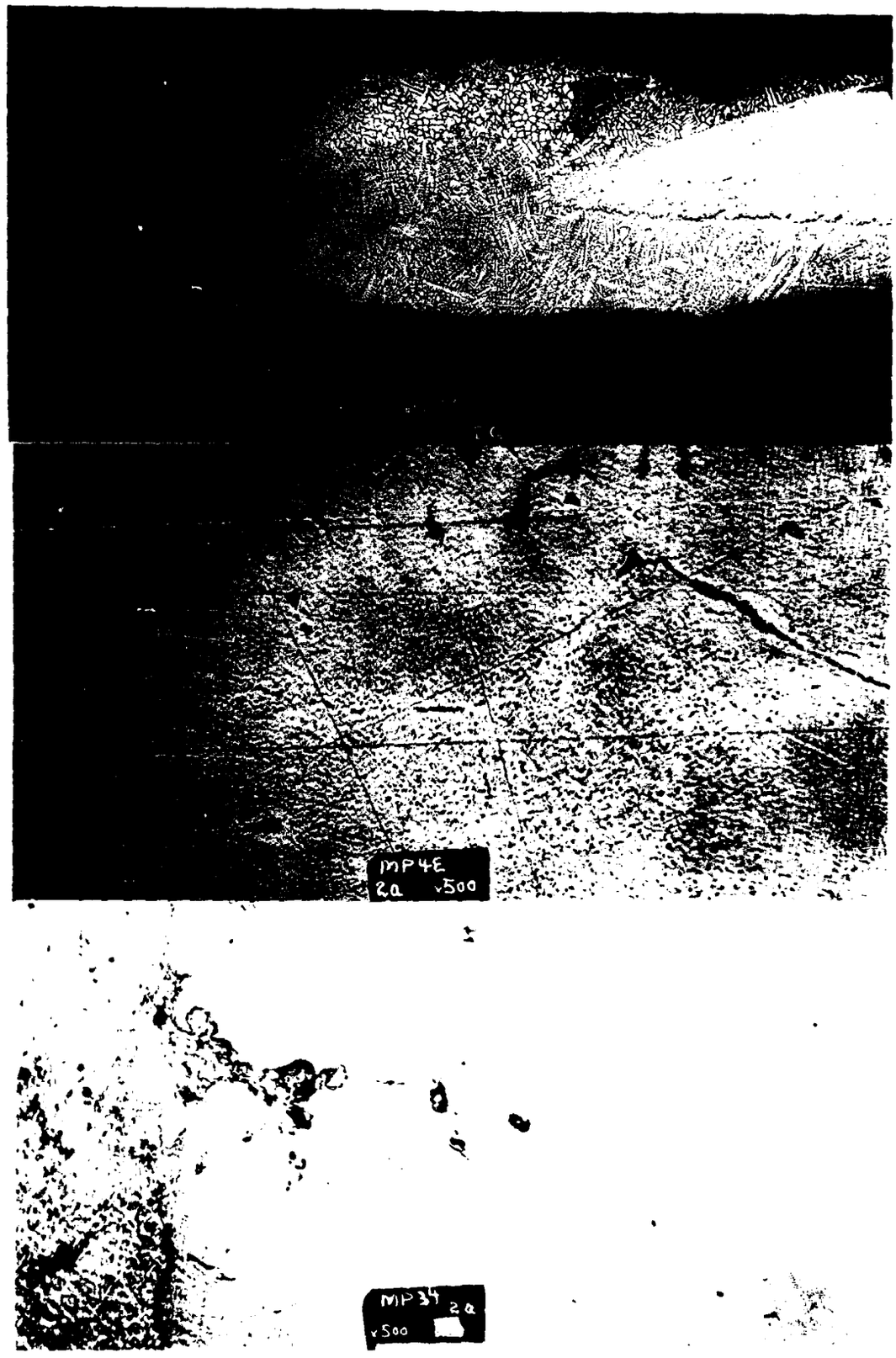

Fig. 2. Same as Fig. 1 after 1950°F, 20 min. water quench. Carbides in weld diffusing into grains away from bounderies. Precipitated carbides in heat affected zone redissolved. Cracks are present in weld metal (MP34).