CT. 6

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Folder: Materials - Uranium 1950

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UNITED STATES
ATOMIC ENERGY COMMISSION
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Files (Thru: V.L.Parsegian, Director, Division of Technical Advisers) December 19, 1950
F. G.Stroke, Division of Technical Advisers

COLD-DRAWING OF URANIUM RODS - BRIDGEPORT BRASS COMPANY

Symbol: TA:FGS:mam

On 12/11/50, an experiment was conducted at the Bridgeport Brass Company in which an attempt was made to cold-draw hot-rolled rods of uranium which had been pickled to remove the oxide coating. In addition, a few unpickled bars were drawn.

It can be concluded from this experiment that we were unable with the lubricants used to draw the pickled rods of uranium. This appears to verify the necessity for an oxide film on the uranium to provide a barrier between the uranium metal and the die to prevent siezing during the drawing operation.

The bars had been annealed previously at 1100°F. Some of these were pickled by immersion in a solution of nitric acid.

The details of the experiment are as follows:

Richard-Whitfield's "BVL" lubricant was used generally; in cases where a different lubricant was used, it will be noted.

All rods were heated to approximately 180°F before drawing.

Rod #1 (unpickled)
- 1st pass
- original size - 1.411" dia.
- die - 1.360" dia. - chrome-plated carbon tool steel.
- final dia. - 1.368"
- drawing rate - 4 ft/min.
- drawing load - 300 psi*

- 2nd pass
- die - 1.344" dia. - carbaloy.
- final size - 1.356" dia.
- drawing rate - 6 ft/min.
- drawing load - 150 psi.

- 3rd pass
- die - 1.322" dia. - carbaloy.
- drawing rate - 7.5 ft/min.
- final size - 1.322" dia. (1.328" dia. at room temp.)
- total reduction in cross-sectional area - 11%.

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Rod #2 (unpickled)
- 1st pass
- original size - 1.410" dia.
- die - 1.360" dia. - chrome plated-carbon tool steel.
- final size - 1.366" dia.
- drawing rate - 4 ft/min.
- drawing load - 25 psi (questionable reading)

- 2nd pass
- die - 1.344" dia. - carbaloy
- final size - 1.356" dia.
- drawing rate - 5.5 ft/min.
- drawing load - 150 psi.

- 3rd pass
- die - 1.322" dia. - carbaloy
- final size - 1.331" dia. (1.328" dia. - room temp.)
- total reduction in cross-sectional area - 11%.

Rod #3 (pickled)
- 1st pass
- original size - 1.403"
- die - 1.375" - chrome plated - carbon tool steel
- final size - 1.365"
- drawing load - 550 psi
- rod siezed - ("BVL" lubricant used)

Rod #4 (pickled)
- 1st pass
- original size - 1.403" dia.
- die - 1.375" dia. - chrome plated - carbon tool steel
- drawing load - 650 psi
- rod siezed - ("EP" - lubricant used)

Rod #5 (pickled)
- 1st pass
- original size - 1.397" dia.
- die - 1.375" dia.
- drawing load - 450 psi
- rod siezed - (Molybdenum - disulphide coat plus "BVL" lubricant)

Rods #6, 7 and 8, pickled -not processed.

Rod #9 (unpickled)
- 1st pass
- original size - 1.411"dia.
- die - 1.353" dia. - carbaloy
- final size - 1.361" dia.
- drawing rate - 4 ft/min.
- drawing load - 275 psi.

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Rod #9 (unpickled) - 2nd pass
- die - 1.322" dia. - carbaloy
- final size - 1.331" dia. (1.328" dia. - room temperature)
- drawing rate - 6 ft/min.
- drawing load - 250 psi
- reduction in cross-sectional area - 11%

Rod #10 - 1st pass
- original size - 1.416" dia.
- die - 1.353" dia. - carbaloy
- final size - 1.360" dia.
- drawing rate - 3.5 ft/min.
- drawing load - 290 psi.

- 2nd pass
- die - 1.322" dia. - carbaloy
- final size - 1.331" (1.327" dia. - room temp.)
- drawing rate - 6 ft/min
- drawing load - 240 psi
- reduction in cross-sectional area -11%

*This pressure is acting on a 13" diameter piston.

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