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HW-USCM-6
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DATE _____

January 9, 1961

GENERAL ELECTRIC

HANFORD ATOMIC PRODUCTS OPERATION - RICHLAND, WASHINGTON

XV

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TITLE

EXPERIMENTAL RESULTS

URANIUM CHEMICAL MILLING

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AUTHOR

C. J. VINTON

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LOCATION

FILES	ROUTE	DATE
100-443888-100	100-443888-100	100-443888-100

SIGNATURE AND DATE

~~General Electric Company, Richland, Washington~~

~~Attention: Mr. W. Hansen~~

W. A. Hendricks

333

7-27-21

~~Classification, Cancelled and Changed To~~

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By Authority of DS Lewis.

PR-24, 4-21-94

By DK Hanson, 59244

Verified By G.E. Savely 5-13-94

MASTER

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54-3000-052 (7-59)

A.E.C.-G.E.-RICHLAND, WASH.

(CLASSIFICATION)

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EXPERIMENTAL RESULTS
URANIUM CHEMICAL MILLING

Sample No.	29		29A	
Date	12/20/60		12/20/60	
Etchant No.				
Source				
Tube				
Inner			X	
Outer	X			
Depth of Cut (max.)	306		317	
Temp. °F.	150° F.		150° F.	
MSM	1.36		1.50	
Concs. (#/M gal.)				
SO ₄ ⁼	4205		4205	
NO ₃ ⁻	1286 - 1317		1286 - 1317	
Cu ⁺⁺	162		162	
U	347 - 395		347 - 395	
Depth (mils)				
1	300	301	314	321
2	300	299	315	319
3	306	293	317	319
4	298	291	316	319
Max. Fillet Height (mils)				
A	284	283	302	305
B	22	18	25	24
C radius 3-1/2"	Rot. 4 RPM		Rot. 4 RPM	
D Min. dev. at outer edge	286	283	292	297
	Pitted		Smooth	
Test By:	C. J. Vinton U		C. J. Vinton U	

A - Minimum deviation at center measured 4 points 90° removed.
 B - Maximum tolerance deviation from top of highest fillet to lowest center point.
 C - Type of Manipulation:
 Rot - Continuous horizontal rotation
 Flip - Periodic 180° vertical reversal of the ends.

MSM - Mils/surface/minute.

U - USCM
 H - Hanford

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Don C. Atkins, Jr.
 Technical Director U

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EXPERIMENTAL RESULTS
URANIUM CHEMICAL MILLING

Sample No.	30	30A	
Date	12/16/60	12/16/60	
Etchant No.			
Source			
Tube			
Inner		X	
Outer	X		
Depth of Cut (max.)	324 322	352 352	
Temp. °F.	165 ± 50 F.	165 ± 50 F.	
MSM	1.81	1.96	
Concs. (#/M gal.)			
SO ₄ ⁼	4237	4237	
NO ₃ ⁻	1290 - 1317	1290 - 1317	
Cu ⁺⁺	161 - 162	161 - 162	
U	296 - 347	296 - 347	
Depth (mils)			
1	324 322	348 351	
2	322 321	352 351	
3	318 322	351 349	
4	320 318	352 352	
Max. Fillet Height (mils)			
A	305 307	327 329	
B	19 15	26 24	
C radius 3-1/2"	Rot. 4 RPM	Rot. 4 RPM	
D	305 308	326	
		328	
	Very smooth, no pits, dishing.	Pit formation, dishing.	
Test By:	C. J. Vinton U	C. J. Vinton U	

- A - Minimum deviation at center measured 4 points 90° removed.
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EXPERIMENTAL RESULTS
URANIUM CHEMICAL MILLING

Sample No.	31	31A	
Date	12/13/60	12/13/60	
Etchant No.			
Source			
Tube			
Inner		X	
Outer	X		
Depth of Cut	300 mils	300 mils	
Temp. °F.	140 ± 5° F.	140 ± 5° F.	
MSM	.78	.88	
Concs. (#/M gal.)			
SO ₄ ⁼	4192	4192	
NO ₃ ⁻	1279 - 1220	1279 - 1220	
Cu ⁺⁺	144 - 162	144 - 162	
U	198.6 - 246.0	198.6 - 246.0	
Depth (mils)			
1	300	300	300 297
2	301	298	301 295
3	304	298	300 297
4	301	298	300 295
Max. Fillet Height (mils)			
A	307	302	297 288
B	18	18	24 25
C	Rot. 4 RPM	Rot. 4 RPM	
D Min. dev. at outer edge	286	282	277 272
	Smooth, groove	Smooth, no	
	at center, slope	groove, slope	
	toward center	toward center	
Test By:	C. J. Vinton U	C. J. Vinton U	

- A - Minimum deviation at center measured 4 points 90° removed.
 B - Maximum tolerance deviation from top of highest fillet to lowest center point.
 C - Type of Manipulation:
 Rot - Continuous horizontal rotation
 Flip - Periodic 180° vertical reversal of the ends.

MSM - Mils/surface/minute.

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EXPERIMENTAL RESULTS

URANIUM CHEMICAL MILLING

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 Rot - Continuous horizontal rotation
 Flip - Periodic 180° vertical reversal of the ends.

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EXPERIMENTAL RESULTS

URANIUM CHEMICAL MILLING

Sample No.	33	33A
Date	12/7/60	12/7/60
Etchant No.		
Source		
Tube		
Inner	1842 mils	X 423 mils
Outer	X 2452 mils	1257 mils
Depth of Cut	300 mils	300 mils
Temp. °F.	165 ± 5° F.	165 ± 5° F.
MSM	2.13	2.36
Concs. (#/M gal.)		
SO ₄ ⁼	4099 - 4192	4099 - 4192
NO ₃ ⁻	1224 - 1293	1224 - 1293
Cu ⁺⁺	152	152
U	0-	0-
Depth (mils)		
1	309 306	299 296
2	308 304	296 295
3	305 308	297 297
4	305 304	300 299
Max.Fillet Height (mils)		
A	291 292	275 278
B	18 16	28 25
C	Rot. 4 RPM	Rot. 4 RPM
D Min.dev. at outer edge	297 296	272 274
	Pits, apparently	Smooth surface
	air inclusions or	
	gas inclusions	
Test By:	C. J. Vinton U	C. J. Vinton U

A - Minimum deviation at center measured 4 points 90° removed.
B - Maximum tolerance deviation from top of highest fillet to lowest center point.
C - Type of Manipulation:
 Rot - Continuous horizontal rotation
 Flip - Periodic 180° vertical reversal of the ends.

MSM - Mils/surface/minute.

U - USCM
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