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REVISIONS TO VARIABLE GOAL EXPOSURE PLANS
FOR PRODUCTION TYPE FUEL ELEMENTS

AUTHOR

R. R. Bloomer and

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December 6, 1960

T. Prudich, Manager
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Manufacturing Section
IRRADIATION PROCESSING DEPARTMENT

REVISIONS TO VARIABLE GOAL EXPOSURE PLANS
FOR PRODUCTION TYPE FUEL ELEMENTS

- Ref: (1) HW-65971, Bloomstrand, RR, "Variable Goal Exposure Plans for Production Type Fuel Elements, 7/6/60, (Secret).
- (2) HW-61579, Music, JF, et al, "Reactor Process Optimization," 8/17/59, (Secret-Red Label).
- (3) HW-64754, Turner, RL and CF Poor, "Process Optimization 709 Program," 4/6/60, (Secret).
- (4) HW-61879, Turner, RL, "Maximizing Net Return at Limited Throughput," 10/7/59, (Secret-Red Label).
- (5) HW-65550, Bloomstrand, RR, "Use of Control Charts for Analysis of Plant Rupture Experience," 6/9/60, (Secret).
- (6) HW-60443, Bloomstrand, RR, "Summary of Recommended Variable Goal Exposure Plans for C-II-N, C-II-E, K-II-N, K-II-E, K-III-N, K-III-E, O-II-N, and O-III-E Material," 8/5/59, (Secret).

Introduction

The purpose of this memorandum is to transmit revisions to the goal exposure plans of reference (1). The plans, herein, supersede the previous recommendations. Similar to the plans of reference (1), the exposures calculated from these plans are designed to maximize plant return on the basis that the only restraint on metal usage is that imposed by the economics of the plutonium production process and associated uranium cycle, as described and defined in references (2) and (3). When metal throughput is limited by ex-reactor physical capabilities to a level lower than the unrestrained requirements, exposures higher than those recommended in this document would be indicated, as explained in reference (4). In essence then, these plans represent minimum economical exposures for current production fuel types, on the basis of attempting to maximize plant returns. The adjustments recommended herein, stem solely from revised estimates of the metal performance level indices (CR values) of the various metal types.

Discussion

Using the control chart method discussed in reference (5), improvements in the performance levels of all production types of fuel elements have been detected. Accordingly, upward revisions to the k constants are in order. It is recommended

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that the k constants for natural and enriched material be increased, respectively by 20 units and 30 units.

Constants for the variable goal equations as defined in reference (6) are summarized in Table I attached.

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TABLE I
CONSTANTS FOR VARIABLE GOAL EQUATIONS

Reactor	Type Metal & Loading	a	b	c	k	Range of Applicable Conditions			Maximum Exposure
						P	F	T	
KE & KW	38 pieces K-III-N 1.460 x .385	-5.2	+8.4	-1075	+1478	Up to 1.5	Up to 64	Up to 23	950
	46 pieces K-III-E 1.454 x .400	-8.4	+12.0	-1803	+2252	Up to 1.5	Up to 70	Up to 23	1700
C	32 pieces C-II-N 1.460 x .375	-7.2	+14.5	-1483	+1450	Up to 1.25	Up to 55	Up to 23	850
	34 pieces C-II-E 1.454 x .375	-9.4	+14.2	-1869	+2082	Up to 1.25	Up to 59	Up to 23	1700
B, D, DR, F, and H	32 or 34 pieces O-II-N 1.445 x .310	-5.5	+11.0	-1220	+1435	Up to 1.25	Up to 50	Up to 23	850
	34 pieces O-II-E 1.440 x .310	-8.2	+17.0	-2180	+2280	Up to 1.25	Up to 55	Up to 23	1700

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