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B-2076 - Metal Loader for "C" Elevator
100-B, D, DR, F, and H Areas

AUTHOR

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December 8, 1955

C. F. Falk
Design Planning Unit
DESIGN SECTION

B-2076 - METAL LOADER FOR "C" ELEVATOR
100-B, D, DR, F, AND H AREAS

CLASSIFICATION CANCELLED AND CHANGED TO
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BY AUTHORITY OF CG-PR-2
RMH/ten 10-14-92
BY JE Savely 10-14-92
VERIFIED BY TL BURNSTOF 10-22-94

In accordance with the request of A. A. Janos, the justification for subject facility is hereby submitted for your use in project preparation.

The proposed work is justified on the basis of increased irradiation capacity for plutonium production and miscellaneous improvements in efficiency of reactor front face work.

The charging rate in the 100-B, D, and F Areas can be increased from 19.5 tubes per hour (see Addendum) to 41.2 tubes per hour by provision of the proposed facilities. Average charging rates are shown in Table II. The higher rate in 105-C is believed to be directly attributable to use of the metal loader. Although charging rates are influenced by differences in charging machines, sticking nozzle caps, the speed with which riser valves can be operated, and the available working space on the elevator, it is believed that the net effect gives no appreciable advantage to 105-C. These rates consider actual charge-discharge time only, not set-up time, equipment difficulties, or other factors which break the continuity of the charge-discharge operations. For a 283-tube discharge, which will be standard in 1957 for 100-B, D, and F Areas (see Table I), the increase in charging rate means a difference between 14.51 hours and 6.87 hours actual charging time, or a savings of 7.64 hours per month per area.

The charging rate in DR and H Areas can be increased from the present 26.4 tubes per hour to 41.2 tubes per hour. In 100-DR Area, where 283 tubes per month will also be the standard or average number discharged, this higher charging rate will

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mean a savings in outage time of 3.85 hours (10.72 minus 6.87). In 105-H, where 314 tubes per month will be discharged, a savings of 4.27 hours per month can be realized (11.89 minus 7.62).

This total of 31 hours outage time saved, on the basis of a level and a is valued at \$19,375 per month.

The use of the metal loaders at 100-B, D, H, F, and H Areas will require supplementing the normal complement of operators with two operators per area on an overtime basis for two shifts. The extra 32 manhours per month per area on an overtime basis will cost approximately \$200, or \$1000 per month for all five areas.

Additional maintenance and inspection costs on the metal loaders is expected to be of the order of \$120 per year per area, or a total of \$600 for five areas. This is based on the use of three men for two hours four times a year in each area at \$5 per man hour.

The net monthly savings by use of the metal loaders will be \$18,325.

Reduction in outage time due to higher charging rate	\$19,375
Less increased manpower costs	1,000
Less increased maintenance and inspection	50
Net monthly savings	18,325

If the proposed metal loaders are installed, at an estimated cost of \$110,000, double return on investment will be realized in each area at an average of 12 months in advance of the installation of equipment for continuous charge-discharge (See Table III). After provision of charge-discharge equipment, this savings in production will no longer continue. However, some benefits will still be realized. Occasionally, during maintenance work on the front face, work must be halted while the charge elevator and crew descend to the work area to (1) pick up heavy tools found necessary to the work, (2) remove from the elevator heavy equipment in order to make room for other material, or (3) pick up special tools or equipment transported at that time from another area for emergency use. The time consumed in this activity is unknown; however, the metal loader would eliminate the need for interrupting front face work and moving the charge elevator for miscellaneous time-consuming trips for material or equipment under 2000 pounds in weight.

[Signature]
Projects Unit
REACTOR SECTION

ADDENDUM

A recent decision to double-deck the Charge Elevators in 105-B, D, and F will reduce the metal-carrying capacity of the elevator which in turn will reduce the charging rate from the present 26.4 tubes per hour to 19.5 tubes per hour. The addition of a working platform over the elevator truss for additional tube replacement crews will increase tube replacement rates by an estimated five percent. It is estimated that more than 200 tubes per month will be replaced in 1956. An increase of five percent in the replacement rate will permit the replacement

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of an extra ten tubes per month. Since each tube replacement requires approximately two hours, a total of 20 hours outage time per month can be saved. This savings in outage time is valued at \$12,500, based on an

- © Since an additional working platform has been estimated to weigh 2000 pounds, its provision will necessitate a reduction in loading of the elevator, during charge-discharge operations, from 12 charges to six (six charges and three metal carts weigh approximately one ton). The elevator will therefore be required to make twice as many trips during the charge-discharge operation. During a 283-tube discharge, which will be standard in 100-B, D, and F Areas with post - CO-558 flows, an extra 23 trips will be required, at 10 minutes per trip. This will add 3.83 hours outage time to the charge-discharge operation and result in a net charging rate of 19.5* tubes per hour. The loss of \$7,200 in outage time in the three areas, however, will be offset by the reduction of \$12,500 in tube replacement costs, and it appears that the decision to double-deck the elevators is well justified.

*
$$\frac{283 \text{ tube discharge}}{26.4 \text{ tubes per hour}} = 10.72 \text{ hours}$$

$$\frac{283 \text{ tube discharge}}{10.72 \text{ hrs.} + 3.83 \text{ hrs.}} = 19.5 \text{ tubes per hour.}$$

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TABLE I
FORECAST
TONS OF METAL TO BE CHARGED
JUNE, 1956 THROUGH DECEMBER, 1957

AREAS

<u>DATE</u>	<u>100-B</u>		<u>100-D</u>		<u>100-F</u>		<u>100-DR</u>		<u>100-H</u>	
	<u>TONS</u>	<u>TUBES</u>	<u>TONS</u>	<u>TUBES</u>	<u>TONS</u>	<u>TUBES</u>	<u>TONS</u>	<u>TUBES</u>	<u>TONS</u>	<u>TUBES</u>
June, 1956	22	173								
July	*		23	181						
August	*		23	181	22	173				
September	36	283	23	181	22	173	*			
October	36	283	23	181	22	173	*			
November	36	283	*		22	173	36	283	25	197
December	36	283	*		22	173	36	283	25	197
January, 1957	36	283	36	283	*		36	283	25	197
February	36	283	36	283	*		36	283	25	197
March	36	283	36	283	36	283	36	283	*	
April	36	283	36	238	36	283	36	283	*	
May	36	283	36	283	36	283	36	283	40	314
June	36	283	36	283	36	283	36	283	40	314
July	36	283	36	283	36	283	36	283	40	314
August	36	283	36	283	36	283	36	283	40	314
September	36	283	36	283	36	283	36	283	40	314
October	36	283	36	283	36	283	36	283	40	314
November	36	283	36	283	36	283	36	283	40	314
December	36	283	36	283	36	283	36	283	40	314
Total	598	4701	524	4120	470	3695	504	3962	445	3497

*CG-558 Outage

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TABLE II

CHARGING RATES
105-B, C, D, DR, F, AND H
JUNE, 1955, THROUGH SEPTEMBER, 1955

<u>AREA</u>	<u>TUBES CHARGED</u>	<u>HOURS*</u>	<u>TUBES PER HOUR</u>
B	716	25.4	28.2
C	2198	53.4	41.2
D	433	17.2	25.2
DR	1141	49.0	23.3
F	441	16.3	27.1
H	1989	71.0	28.0

* Actual charging time only; set-up time, equipment difficulties, etc., are excluded.

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TABLE III

	<u>105-B</u>	<u>105-D</u>	<u>105-F</u>	<u>105-DR</u>	<u>105-H</u>
Beneficial Use	12-56	1-57	2-57	3-57	4-57
Double Return on Investment	10-57	11-57	12-57	11-58	10-58
Charge-Discharge Installation	1-59	2-59	3-59	5-59	6-59
Period Between Double Return and Charge-Discharge	15 months	15 months	15 months	6 months	8 months

Note: Although the indicated return on investment is less for 105-DR and H, it is probable that the tube replacement program will require the provision, prior to the advent of charge-discharge equipment, of an extra platform on the Charge Elevators in these areas. It is possible that a full scale tube replacement program will be underway in DR and H even before metal loaders are provided, in which case the rate of return will be just as attractive as it is for B, D, and F.

END

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5 / 14 / 93