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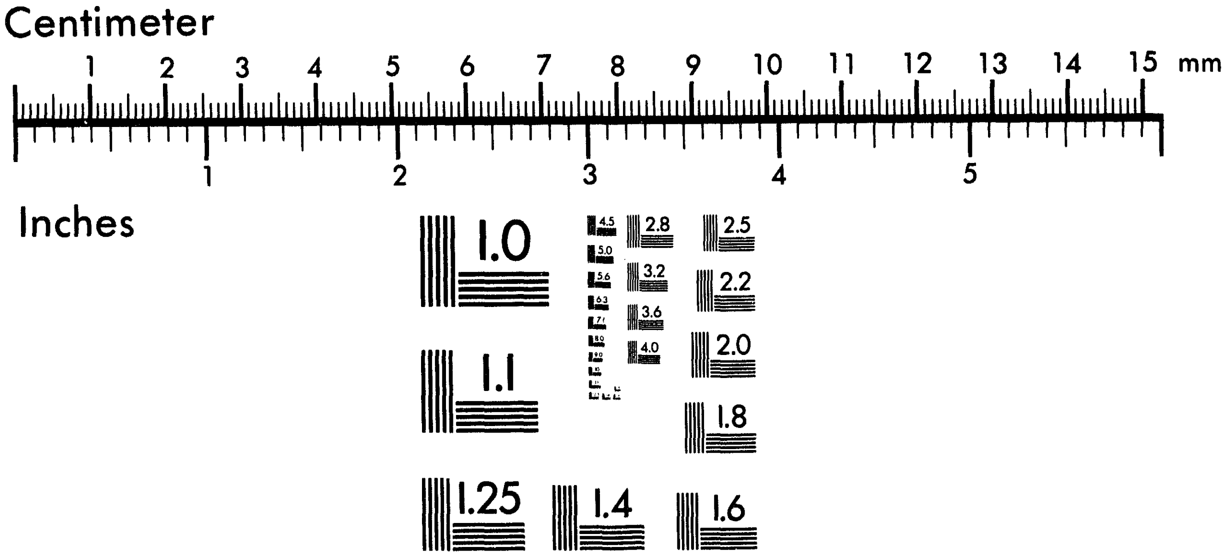

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105-N CHARGE-DISCHARGE RATES

July 2, 1959

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105-N CHARGE-DISCHARGE RATES

SUMMARY

Figures have and can be generated that indicate a higher charge-discharge rate if required before 105-N will be comparable with existing reactors. Also, these figures show an apparent operating cost incentive to increase the charge-discharge rates proposed for 105-N. Although these figures may be true by themselves, other figures developed from the same information and stated on a basis that affords a true comparison, show that the proposed rates for 105-N are compatible with those in existing reactors. However, the accomplishments of existing reactors should be considered as a guide only and not as Criteria since the design basis has already been established for Project CAI-816.

An average* charge-discharge rate has been proposed for 105-N that is compatible with the two main ground rules of the Project. Namely, the capital cost limitation and the plant factor. This rate of 8 tubes/hr. is one that appears to be reasonable from the charge-discharge design aspects and there is a good possibility that it can be increased with operational experience.

DISCUSSION

Some figures have been generated that show an efficiency increase from 0.64% to 1.59% by increasing the stipulated charging rate. These figures maybe true but fail to point out that the charge-discharge of 8 tubes per hour is compatible with the major ground rules noted above. Whereas, the increased rates may not be. By utilizing these figures on the same narrow approach and ignoring the ground rules, it would be possible to make operational charge-discharge appear economical. This approach is not compatible with the Project philosophy as dictated to design.

When expressed in percent of metal ready for discharge or monthly thru-put, the rate of 8 tubes per hour is comparable to the maximum charge-discharge rates that have been developed in existing reactors. The data in Figure I shows the comparison of charge-discharge rates now being achieved in F & K reactors with those proposed for N. The comparison basis of metal ready for discharge is the one that presents the best comparison of reactors that are as different as N will be from the existing reactors.

If the comparison of N to existing reactors is going to supercede the existing ground rules, it is important to consider the numerous items that are different and how they affect areas such as the charge-discharge rates. Some of these items are:

1. The critical mass aspects of the new fuel elements.

2. The limitations and requirements of the equipment required to handle the larger, longer and heavier fuel element.

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* The total hours required for actual charge-discharge work and valving is divided into the number of tubes charged to obtain this value.

3. The confinement aspects that complicate and restrict charge-discharge activities.

4. The problems involved to gain access and to seal process tubes exposed to high pressure, temperature conditions.

5. The problems associated with keeping radiation dose rates below acceptable levels.

6. The conveying, segregating, and grouping of discharge material at the rate it is being displaced from the reactor.

These are but a few of the differences that must be considered when such comparisons are made in order to keep the comparisons on a logical and complete basis.

TABLE I

ASSUMPTIONS

	105-N	105-K	105-F
REACTOR POWER LEVEL MW	4000	3000	1400
EXPOSURES MWD/T	1000 & 2000	600	480
PLANT FACTOR %	80	75	80
AVER. CHARGING RATE TUBES/HOUR	8	26	35
METAL PER TUBE POUNDS	700 & 875	300	256

FIGURE 1

PERCENT OF MONTHLY THRU-PUT DISCHARGED PER HOUR AT THE RATE OF 8 TUBES PER HOUR. (THE MAXIMUM MASS CHARGING RATES FOR EXISTING REACTORS ARE SHOWN FOR COMPARISON).

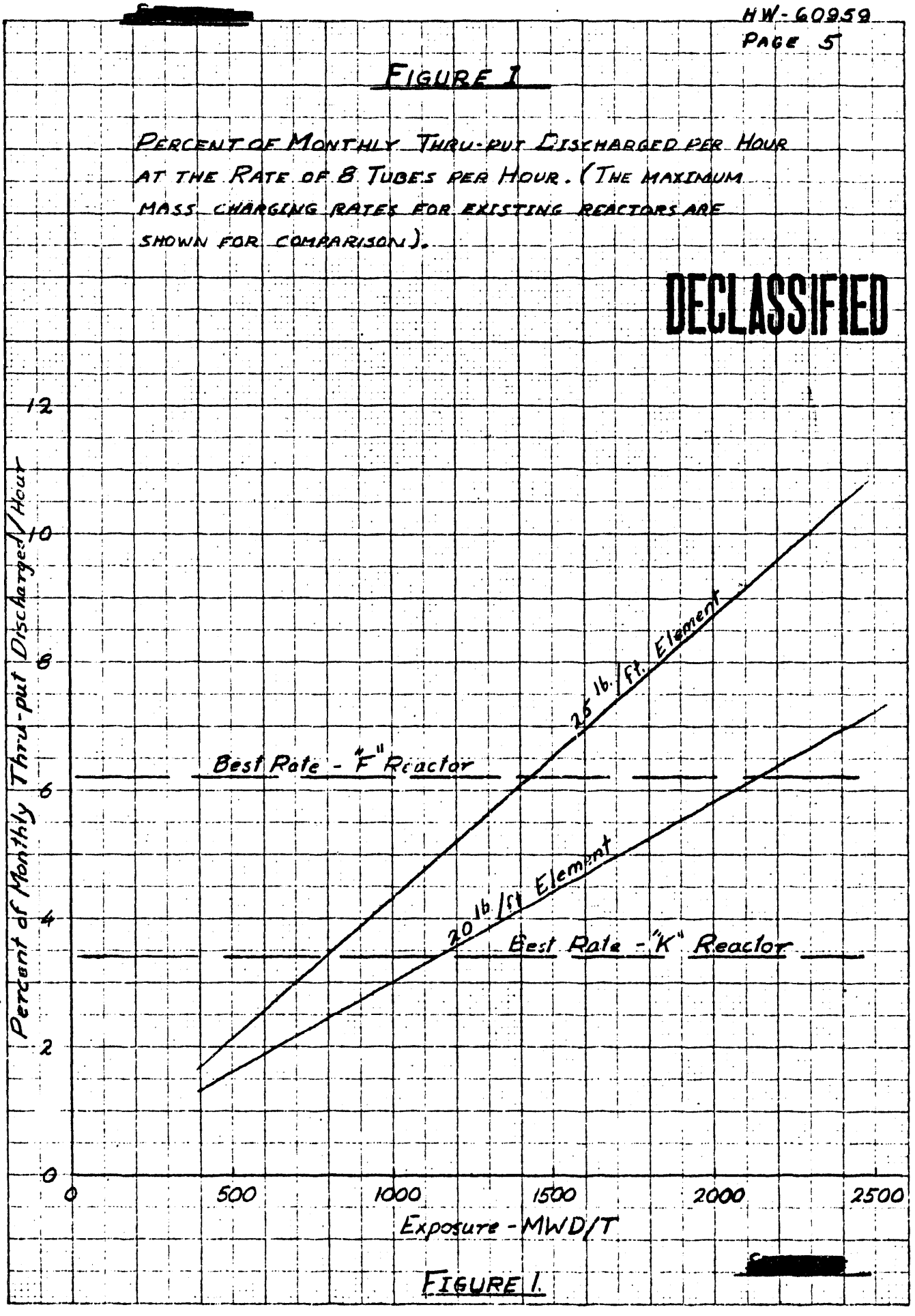

FIGURE 1.

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