O

DECLASSIFIED

-1-

HW-27680

SECURITY INFORMATION

1. R. S. Boll
2. V. R. Chapman
3. W. N. Mobley
4. C. T. Grosz
5. L. I. Brecke
6. C. P. Cabell
7. C. A. Rohrmann
8. J. M. Frame
9. V. R. Cooper
10. F. W. Woodfield
11. R. E. Smith
12. R. E. Tomlinson
13. J. T. Stringer
14. R. G. Post - M. J. Szulinski
15. J. G. Bradley
- 16.-18. Extra
19. 700 File
20. 300 File
21. Yellow Copy

DECLASSIFIED

By Authority of CG-PR-2

CH Henager 6-1-92

By PM Eick 12-14-93

Verified By J. J. Wells 12-15-93

RECORD CENTER FILE

This Document consists of
5 Pages, No. 21 of
21 Copies, Series A

COPY 1 OF 1, SERIES A

TO: File

FROM: R. G. Post and M. J. Szulinski

ECONOMIC EVALUATION OF CONTINUOUS UNH CALCINATION
DOCUMENT HW-27283 REVISED

INTRODUCTION

Document HW-27283 recorded the annual cost saving to be expected through the operation of continuous calcination equipment in relation to the cost of operating the present batch equipment. Clarification of items included in certain indirect manufacturing expenses has led to the revision of the expected savings. Total savings per year, including DME, are reduced to \$230,000 from \$405,000 and direct cost savings are revised to \$198,000 instead of \$228,000. These savings result in pay-off periods of 1.5 years and 1.8 years based on total and direct savings respectively.

A program to develop a suitable continuous UNH calcination process and equipment is now in progress with the objective of augmenting or replacing the existing batch process in 224-U Building. This document sets forth the savings calculated for complete replacement of the batch pots with a new continuous process. Although subject to later firming-up, for the basis of this savings calculation it is assumed that two parallel continuous calcination units would be installed with a combined nominal design capacity of 15 tons of uranium/day average (18.5 tons/day instantaneous rate). However, in the event of a forced shutdown of one line for repairs, it is expected that the other line would be capable of carrying well over half of the above capacity in order to minimize lost production.

SUMMARY

The production costs and estimated installation costs presented in the table below are for an average production rate of 15 tons U per day. The costs are for one year of operation.

DISTRIBUTION RESTRICTED TO U.S. ONLY

DECLASSIFIED

300 AREA
DECLASSIFIED FILES

MASTER

DECLASSIFIED

-2-

HW-27680

<u>Item</u>	<u>Present Process</u>	<u>Continuous Process</u>	<u>Difference</u>
Direct Labor	\$258,000.	\$124,000.	\$134,000.
Supervision	---	---	24,000.
Electric Power	25,000.	17,000.	8,000.
Maintenance	65,000.	33,000.	32,000.
		Sub-total	\$198,000.
		IME	32,000.

Total - Annual savings for continuous calcination \$230,000.

Since the cost of installing a continuous calciner is estimated to be approximately \$350,000 (including project overhead and contingencies) such an installation would be paid off in approximately 1.8 years based on the \$198,000 annual direct saving, or in approximately 1.5 years based on the total \$230,000 annual saving which includes IME costs.

DISCUSSION

Operating Costs

The data for the cost of operating the present equipment and the reductions in manpower which may be realized by using continuous operation, were obtained by consultation with members of the U facility Manufacturing Department staff.

Direct Labor

The present manpower requirements for the 224-U Building depend upon production rates as shown in the following table:

<u>Production Rate</u>	<u>Present Process</u>			<u>On days</u>		
	<u>On each of 4 shifts</u>			<u>On days</u>		
	<u>Chief Op.</u>	<u>Process Op.</u>	<u>Train.</u>	<u>Chief Op.</u>	<u>Process Op.</u>	<u>Train.</u>
Tons U/Day, Instant.						
8.4 to 11.8	1	2	6	0	1	3
11.8 to 15.2	1	2	7	0	1	3
15.2 to 18.6	1	2	8	0	1	3
15 tons average:	1	2	8	0	1	3
Total	4	8	32	0	1	3

Total Chief Operators - 4 - \$449.32 per week

Total Process Operators - 9 - 972.27

Total Trainees - 35 - 3,538.85

\$4,960.44 per week or \$257,942.88 per year

DECLASSIFIED

DECLASSIFIED

-3-

HW-27680

The distribution of manpower for a continuous calciner will provide one operator and one trainee for the graphic panel, and one operator and two trainees for the calciner and drum loading room. This results in the following manpower requirements:

<u>Production Rate</u>	<u>Present Process</u>					
	<u>On each of 4 shifts</u>			<u>On days</u>		
	<u>Chief</u>	<u>Process</u>		<u>Chief</u>	<u>Process</u>	
	<u>Op.</u>	<u>Op.</u>	<u>Train.</u>	<u>Op.</u>	<u>Op.</u>	<u>Train.</u>
15 tons/day average	0	2	3	0	1	2
Total Chief Operators	0		\$ 0.00	0		
Total Process Operators	9		927.27			
Total Trainees	14		1,415.54			
Total Cost (incl. shift differential and isolation pay)				\$2,387.81 per week		
				\$124,166.12 per year		
Savings - \$133,776.76 per year						

Since there is such a large reduction in the direct labor, it is felt that a shift supervisor can be released. This is a savings of \$6,000 per year per shift or a total of \$24,000 per year.

Electric Power

Building 224-U is equipped with peak load watt meters and the present load is about 1000 KW of which 750 KW can be charged to the pot room. This load will increase with production rates and for 15 tons per day, the load will be 1125 KW. Two continuous calciners should operate without exceeding 750 KW. This results in a decrease of 375 KW at \$22 per KW year for a total saving of \$8,250 per year.

Indirect Manufacturing Expense

The IME for a continuous calciner was estimated and presented in the following table. Some items were calculated separately and these are omitted from the IME part of this table. Those items for which no saving is predicted are assumed to be independent of method of operation and the number of personnel charged to direct labor. All other items are taken to be directly proportional to direct labor.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DECLASSIFIED

DECLASSIFIED

-4-

HW-27680

Rate: 15 tons of uranium per day

Cost figures: Dollars per year

Item	Present Process	Continuous Process	Save
Material direct	0.00	0.00	0.00
Labor direct	257,942.88	124,166.12	133,776.76
Supervision			24,000.00
Electrical	24,750.00	16,500.00	8,250.00
Maintenance	65,124.00	33,000.00	32,000.00
I.M.E. (not already accounted for)			
Engineers, clerical and others	3,516.00	1,758.00	1,758.00
Continuity of service	25,794.00	12,417.00	13,377.00
Area bus service	12,600.00	6,300.00	6,300.00
Area Road Maintenance	1,080.00	540.00	540.00
Laundry	18,000.00	9,000.00	9,000.00
Other Services	2,000.00	1,000.00	1,000.00
Totals			
Direct costs	347,818.00	173,666.00	174,027.00
Supervision	---	---	24,000.00
IME	62,990.00	31,015.00	31,975.00
			\$230,002.00

*Cost figures from November and December operation.

Cost of Installation of Continuous Calciner

Capacity Basis: 400 tons per month
 15 tons per day, sustained
 18.5 tons per day, maximum instantaneous rate

Item	
2 Calcining Units	\$ 75,000
Piping	20,000
Instrumentation	20,000
Installation and building changes	50,000
Sub-total - - - - -	\$165,000
Contingency (25%)	41,000
Sub-total - - - - -	\$206,000
Contract Plus Fixed Fee	103,000
Sub-total - - - - -	\$309,000
Design charges	31,000
Total Cost - - - - -	\$340,000

DECLASSIFIED

DECLASSIFIED

HW-27000

The advantages of a continuous calciner may be considerably greater than those arising from the reduction in operating costs. These advantages include:

1. Releasing additional manpower for program "X". This amounts to 25 operators and 4 shift supervisors.
2. Improvement in production quality. This can be realized by better control and greater uniformity.
3. Hydration of UO_3 could be readily introduced.
4. Reduction of dust hazard. This would result from a sealed system and the elimination of the pneumatic unloading system.
5. Greater assurance against "crash" shutdowns which would stop Purex and Redox plants. This arises from a large margin of extra capacity provided by two continuous units.
6. Material of higher radiation level can be processed since contact operation will not be required except for the drum loading which can be shielded.
7. It is expected that the continuous units, if properly designed, may be insensitive to the foaming which occurs in the batch pots, caused by traces of tributyl and dibutyl phosphates. Hence less interference with calcination capacity would be expected during periods when traces of TBP and/or DBP are inadvertently present in the UNH feed to the calcination step - and it may even develop that steam stripping of RCU would no longer be required.

DECLASSIFIED

DATE

FILMED

4 / 13 / 94

END