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Spent Nuclear Fuel Project Design Basis Capacity Study

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Abstract: A parametric study of the Spent Nuclear Fuel Project system capacity is presented. The study was completed using a commercially available software package to develop a summary level model of the major project systems. Alternative configurations, sub-system cycle times, and operating scenarios were test to identify their impact on total project duration and equipment requirements.

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SPENT NUCLEAR FUEL PROJECT DESIGN BASIS

Spent Nuclear Fuel Project (E56128 / F5K5R3)

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Hanford Operations and Engineering Contractor for the
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ENGINEERING REPORT

SPENT NUCLEAR FUEL PROJECT DESIGN BASIS

Spent Nuclear Fuel Project (E56128 / F5K5R3)

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CONTENTS

1.0 INTRODUCTION	1
2.0 SUMMARY	1
2.1 METHOD	1
2.2 ASSUMPTIONS	2
2.3 RESULTS	3
3.0 RECOMMENDATIONS	6
3.1 SYSTEM MODEL REFINEMENT	6
3.2 CASK HANDLING AND TRANSPORTATION CREW	6
3.3 CSB OPERATIONS	6
3.4 ACCOUNTING FOR MAINTENANCE, BREAKDOWNS, REWORK, AND ACCIDENT	6
3.5 LABOR RESOURCE ALLOCATION	7
4.0 DETAILED DISCUSSION	7
4.1 BASE CASE (THREE 8 HR SHIFTS/DAY, 5 DAYS/WEEK)	10
4.2 CASE 1. TWO 12 HR SHIFTS/DAY, 5 DAYS/WEEK.	13
4.3 CASE 2. THREE 8HR SHIFTS/DAY, 5 DAYS/WEEK. FUEL RETRIEVAL OPERATING AT 90% EFFICIENCY.	14
4.4 CASE 3. THREE 8HR SHIFTS/DAY, 5 DAYS/WEEK. FUEL RETRIEVAL OPERATING AT 80% EFFICIENCY	15
4.5 CASE 4. THREE 8 HR SHIFTS/DAY, 5 DAYS/WEEK. FUEL RETRIEVAL CYCLE TIMES OF MIN = 16, MODE = 17, AND MAX = 30	16
4.6 CASE 5. THREE 8 HR SHIFTS/DAY, 5 DAYS/WEEK. WITH LONG REPAIR TIMES ON FUEL RETRIEVAL, MHM, AND HOT CONDITIONING.	17
4.7 CASE 6. THREE 8 HR SHIFTS/DAY, 7 DAYS/WEEK	18
4.8 CASE 7. TWO 12 HR SHIFTS/DAY, 7 DAYS/WEEK	20
4.9 CASE 8. THREE 8 HR SHIFTS/DAY, 7 DAYS/WEEK. USING 5 COLD VACUUM DRYING STATIONS	21
4.10 CASE 9. THREE 8HR SHIFTS/DAY, 7 DAYS/WEEK. USING 4 COLD VACUUM DRYING STATIONS	22
4.11 CASE 10. THREE 8HR SHIFTS/DAY, 7 DAYS/WEEK. USING 2 LOADIN/LOADOUT PITS IN THE CSB	23
4.12 CASE 11. THREE 8HR SHIFTS/DAY, 7 DAYS/WEEK. USING 5 HOT CONDITIONING STATIONS	24
4.13 CASE 12. THREE 8HR SHIFTS/DAY, 7 DAYS/WEEK. USING 4 HOT CONDITIONING STATIONS	25
4.14 SNF PROCESS CYCLE TIMES	26
5.0 REFERENCES	29
APPENDIX A. VALIDATION REQUIREMENTS	A-1
APPENDIX B. WITNESS OUTPUT	B-1
APPENDIX C. WITNESS MODEL TRIAL RUNS	C-1

Figures

4.1.	Illustration of a One-line, One Server Queuing System.	8
4.2.	Spent Nuclear Fuel Project Schematic Used for Witness Modeling . . .	9
4.3.	Base Case Machine Usage	11
4.4.	Case 1 Machine Usage	13
4.5.	Case 2 Machine Usage	14
4.6.	Case 3 Machine Usage	15
4.7.	Case 4 Machine Usage	16
4.8.	Case 5 Machine Usage	17
4.9.	Case 6 Machine Usage	19
4.10.	Case 7 Machine Usage	20
4.11.	Case 8 Machine Usage	21
4.12.	Case 9 Machine Usage	22
4.14.	Case 10 Machine Usage	23
4.15.	Case 11 Machine Usage	24
4.16.	Case 12 Machine Usage	25

Tables

1.	Results of case studies for the SNF Project	4
2.	Comparison of cases studied.	5
3.	Ramp-up cycle for K West basin	10
3.	Ramp-up cycle for K East basin	10
4.	Spent Nuclear Fuel Project Element Time Cycles used for Model Development	12

SPENT NUCLEAR FUELS PROJECT DESIGN BASIS CAPACITY STUDY

1.0 INTRODUCTION

The mission of the Spent Nuclear Fuel Project (SNFP) is to repackage the fuel from the 100K Area fuel storage basins and transfer the fuel to a safe dry storage facility in the 200E Area plateau. The Multi-Canister Overpacks (MCO) are filled with fuel rods retrieved from the 100K East and 100K West wet storage basins, moved into a vacuum drying process line, transported to staging at the Canister Storage Building (CSB), then conditioned in a heated vacuum process, and finally returned to dry storage in the CSB.

The first purpose of this task was to develop a process simulation model that depicts the architecture of the Spent Nuclear Fuels (SNF) process systems. The model is a basic high-level model that includes the fuel retrieval system; cask loadout station; transportation to the vacuum drying stations; vacuum drying stations; transportation to the CSB; the MCO handling machine and the hot vacuum conditioning stations; and return of the empty cask to the basin. The model can be refined with detailed information if needed to support additional studies.

The second purpose of this task was to evaluate a variety of SNF operating scenarios using the process simulation model.

2.0 SUMMARY

2.1 METHOD

Witness -TM (TRADEMARK), developed by AT&T ISTEEL, is a general discrete simulation language that is in common use by manufacturing industries to investigate production line capability, capacity, efficiency, equipment utilization, queues, bottlenecks, and other problems. Witness models are flexible and allow different scenarios to be developed and tested quickly and efficiently.

Currently this software package is being used by the Fuel Retrieval and Cold Vacuum Drying sub-projects of the SNFP to simulate the production activities/elements as part of design efforts. A demonstration model, developed for fuel retrieval, was viewed and this language appears to have the capabilities required to simulate the SNF Project top level process.

Witness extends the analytic capability of an industrial engineer, by enabling him to perform repeated random experiments on a system. Simulation allows the engineer to test various system changes without building the physical system and achieve optimum design of the physical system.

2.2 ASSUMPTIONS

Assumptions were made in developing the Witness model of SNFP sub-project interactions. The accuracy of these assumptions could affect the validity of the results of this study. They include:

- Analysis results based on the utilization of the Witness software will not affect health or safety of the personnel engaged with the SNF Project.
- Boeing Hanford IRM Department validated the licensing of this software according to WHC-CM-3-10.
- Test models developed were based upon the methodology of the initial system configuration from the "Development of Design Basis Capacity for Spent Nuclear Fuel Project Systems" (Pajunen 1996).
- Process times of the model were based upon triangular distributions. These distributions are characterized with a low, high, and mode cycle time for production of a MCO. Low indicates the low value hours per cycle time or high throughput rate, high indicates the high value hours per cycle time or the low throughput rate. Mode is the expected time for the distribution, in the limit the expected value is considered the average time hours per cycle.
- Supply of MCO satisfy the processing requirement, either an adequate inventory of MCO will exist or delivery of the MCO's will be just-in-time to satisfy any rate or production requirement.
- The design is based on removing the fuel from the basins within two years. The design basis capacity for each of the simulated systems relates the desired annual processing rate divided by the estimate operating efficiencies.
- This system will run 200 cycles at both K East and K West Basins to completely remove all of the estimated spent nuclear fuel.
- All processes are based on working 18 hours per day for three 8 hr shifts or 20 hour per day for 12 hr shifts.
- The model is not labor resource limited or restricted. There is an unlimited labor pool available for the required operation and repairs.
- The system runs long enough to achieve a steady-state condition, the probability law governing the behavior of the real system will stabilize.
- Once a loaded MCO is in the system it may not leave the queue.
- Cycle times of the MHM and CSB loadin/loadout crane are independent. Interferences between the two were not modeled.

2.3 RESULTS

Results in this report are based on process cycle times determined from input by the sub-project design authorities. The results should not be taken as absolute answers but should be used as guides in decision making. Further detailed modeling should be done to refine the model and add in factors such as transportation crews, equipment breakdown analysis, availability of operating crews and repair crews. Some key areas looked at in this report are: time to empty the basins, time to finish hot conditioning, number of operations of cold vacuum drying and hot conditioning, and the number of casks needed for the various cases. The results are listed in Table 1. Table 2 is a summarized comparison of the differences between some of cases studied. Detailed descriptions of each case are listed in sections 4.1 to 4.13.

Some general observations of the results indicate the following trends.

1. Fuel retrieval is the limiting process in this model.
2. Speeding up fuel retrieval by improving the production rates, working more days per week, or increasing the "operating efficiency" will directly and significantly reduce the basin emptying time.
3. Limiting the number of CVD or HVC stations to 4, or casks to 6, will not adversely impact the basin emptying time. (Only the HVC completion time is increased by reducing the number of HVC stations.)
4. Using more CVD stations (or using more of the stations more of the time) will require using more casks.
5. Marginal increases in breakdown severity cause marginal increases in the basin emptying time.
6. The MCO pit in the CSB is not a bottleneck (for the range of breakdown severities modeled here).
7. The MHM and overhead crane in the CSB are not bottlenecks (for the range of breakdown severities modeled here).
8. The cask transporters are not bottlenecks as modeled here as independent operating units.

Table 1. Results of case studies for the SNF Project.

Case No.	Shift schedule			Operating efficiency				Notes	Time to finish (yrs)			No. Cold vac of operations						No. Hot cond operations						Casks needed
	No. Shift	days/week	hr/day	Fuel ret.	CSB crane	MHM	All others		KW	KE	HC	CV1	CV2	CV3	CV4	CV5	CV6	HC1	HC2	HC3	HC4	HC5	HC6	
Base	3	5	18	70%	95%	90%	70%	Relatively short frequent breakdowns	2.7	2.8	2.9	137	123	104	35	1	0	73	72	70	66	63	56	6
1	2	5	20	70%	95%	90%	70%	2 shifts/day	2.5	2.6	2.7	124	113	99	64	0	0	67	68	68	68	65	64	6
2	3	5	18	90%	95%	90%	70%	90% TOE on fuel retrieval	2.2	2.3	2.6	115	103	88	74	20	0	67	67	67	67	66	66	7*
3	3	5	18	80%	95%	90%	70%	80% TOE on fuel retrieval	2.5	2.6	2.6	124	113	96	63	4	0	67	68	67	67	66	65	6*
4	3	5	18	70%	95%	90%	70%	Fuel retrieval times were reduced by 20 hrs per MCO	1.6	1.7	2.6	85	78	69	60	55	53	66	67	67	67	67	66	9
5	3	5	18	70%	95%	90%	70%	Time to repair fuel retrieval, MHM, and hot conditioning was increased	2.8	2.8	2.8	135	119	98	44	4	0	69	70	67	66	64	64	6*
6	3	7	18	70%	95%	90%	70%	Working 7 day/week	2.0	2.1	2.5	112	102	90	81	15	0	68	67	66	66	67	66	6*
7	2	7	20	70%	95%	90%	70%	2 shifts/day 7 day/week	1.9	2.0	2.5	106	92	86	73	43	0	67	67	67	67	67	65	7
8	3	7	18	70%	95%	90%	70%	5 cold vacuum drying stations	2.0	2.1	2.5	113	103	91	82	11	NA	68	66	67	67	67	65	6*
9	3	7	18	70%	95%	90%	70%	4 cold vacuum drying stations	2.0	2.2	2.5	113	103	96	88	NA	NA	66	67	67	67	67	66	6*
10	3	7	18	70%	95%	90%	70%	Two CSB loadin/loadout pits	2.0	2.2	2.5	116	102	93	84	5	0	65	67	66	68	68	66	6*
11	3	7	18	70%	95%	90%	70%	5 hot condition stations	2.0	2.1	2.8	111	102	89	80	18	0	79	80	79	81	81	NA	6
12	3	7	18	70%	95%	90%	70%	4 hot condition stations	2.0	2.1	3.3	112	102	92	82	12	0	101	100	100	99	NA	NA	6*

* Uses one additional MCO less than 10 times. Using the amount specified should not significantly increase the time to finish.

Table 2. Comparison of cases studied.

CASE COMPARISON	COMPARISON DESCRIPTION	INTERPRETATION OF RESULTS
BASE CASE	3 shifts/day (18 hrs) 5 days/week (FRS) 70% efficiency (FRS)	Takes 2.7 years to empty basins; K West; 2.8 yrs to empty KE; takes 2.9 years to complete HVC; uses up to 6 casks.
BASE VS CASE 1	NUMBER OF SHIFTS/DAY: Compare 3 8 hr vs 2 12 hr shifts /d, ie 18 vs 20 hr/d (for 5 d/wk operation)	Reduces time to empty basins and complete HVC by 2 months; doesn't affect number of casks used; doesn't affect number of CVD stations.
CASE 6 VS CASE 7	NUMBER OF SHIFTS/DAY: Compare 3 8 hr vs 2 12 hr shifts /d, ie 18 vs 20 hr/d (for 7 d/wk operation)	Doesn't affect time to empty basins; doesn't affect time to complete HVC; doesn't affect number of casks used; doesn't affect number of CVD stations.
BASE VS CASE 6	FRS OPERATING DAYS: Compare 5 d/wk vs 7 d/wk FRS operations (for 3 8 hr shifts/d ops)	Reduces time to empty basins by 8 months; reduces time to complete HVC by 5 months; doesn't affect number of casks used; doesn't affect number of CVD stations.
CASE 1 VS CASE 7	FRS OPERATING DAYS: Compare 5 d/wk vs 7 d/wk FRS operations (for 2 12 hr shifts/d ops)	Reduces time to empty basins by 6 months; reduces time to complete HVC by 2 month; increases number of casks used to 7; doesn't affect number of CVD stations.
BASE VS CASE 3 VS CASE 2	FRS OPERATING EFFICIENCIES: Compare FRS operating efficiencies of 70% (base), 80%, and 90%.	Reduces time to empty basins by 2 and 6 months, respectively; reduces time to complete HVC by 4 months, in either case; increases the number of casks to 6 and 7, respectively; doesn't affect number of CVD stations.
BASE VS CASE 4	FRS CYCLE TIMES: Compare FRS cycle times of 37 hrs/MCO (base) vs 17 hrs/MCO.	Reduces time to empty basins 13 months; reduces time to complete HVC by 4 months; increases the number of casks used to 9; increases number of CVD stations to 6.
BASE VS CASE 5	BREAKDOWN SEVERITY: Compare base case breakdown frequency and repair times vs fewer occurrences but longer repair times.	Marginally increases time to empty basins doesn't affect time to complete HVC; doesn't affect number of casks used; doesn't affect number of CVD stations.
CASE 6 VS CASE 8 VS CASE 9	NUMBER OF CVD STATIONS: Compare 6 CVD stations vs 5 and 4 CVD stations (7 d/wk FRS operations)	No apparent affect. Doesn't affect time to empty basins; doesn't time to complete HVC; doesn't affect number of casks used.
CASE 6 VS CASE 11 VS CASE 12	NUMBER OF HVC STATIONS: Compare 6 HVC stations vs 5 and 4 HVC stations (7 d/wk FRS operations)	Doesn't affect time to empty basins; increases time to complete HVC by 4 and 10 months, respectively; doesn't affect number of casks used; doesn't affect number of CVD stations.
CASE 6 VS CASE 10	NUMBER OF MCO PITS: Compare 1 MCO pit in the CSB to 2 MCO pits. (7 d/wk FRS operations)	No apparent affect. Doesn't affect time to empty basins; doesn't time to complete HVC; doesn't affect number of casks used; doesn't affect number of CVD stations.

3.0 RECOMMENDATIONS

3.1 SYSTEM MODEL REFINEMENT

The process simulation model evaluates the flow of spent nuclear fuel from retrieval to storage using the base case configuration and cycle times. Comparison cases were run using different operating configurations or cycle times (i.e., five vacuum stations instead of six or 17 hours to fill an MCO instead of 37), to determine the effects on throughput and schedule. Additional sensitivity analyses can be run to evaluate the effects of changing other parameters or combinations.

The results of process simulation studies from each of the SNF subprojects can be imported into the integrating model to further refine the overall project capacity and queue sizing. There is a need to verify the consistency of data for each element of the model with the responsible design authority, and to review the development of the cycle times to ensure common assumptions and limitations, and definitions of terms.

3.2 CASK HANDLING AND TRANSPORTATION CREW

Additional studies can be performed to analyze the cask handling and transportation system to determine how many trucks and crews will be required. This can most easily be done by decomposing the main processes into functions performed by the fixed crew and functions performed by the traveling crew, then apportioning the cycle times to these sequences of functions. The process simulation model can be modified to incorporate these changes and further refine the system capacity.

3.3 CSB OPERATIONS

There are a number of uncertainties in the process cycle times for the CSB, which could cause distortions to model results and conclusions. This is compounded by the fact that there are several pieces of equipment that are single items with no identified work-arounds, and because of schedule conflicts when some of this equipment is competing for common space. Receiving, inspecting, and rework/testing of empty MCO's is not addressed in the model. Schedule interferences between the cask handling function of the overhead crane and the HVC loading/unloading function of material handling machine working in the same common space is not currently addressed in the model. Cycle time for the truck in the CSB could be greatly improved if the number of cask pits were increased and the work flow modified; also empty MCO handling could be improved, and schedule conflicts with the MHM could be mitigated.

3.4 ACCOUNTING FOR MAINTENANCE, BREAKDOWNS, REWORK, AND ACCIDENTS

The case comparisons showed that marginal increases in breakdown severity result in marginal increases in basin emptying time. However, the breakdown frequencies and repair times in both the base case and the comparison case were somewhat arbitrary, leading to potential distortion of

the results and conclusions. A better representation of breakdown frequencies and repair times can be estimated by identifying equipment suspect of failure, and contacting suppliers and users for reliability and maintainability analyses of similar mechanical and electrical equipment. Similar studies can examine the effects of product rework, and accident scenarios on fuel throughput and how they affect the schedule.

3.5 LABOR RESOURCE ALLOCATION

The Witness model assumes that there is an unlimited supply of labor resources available, as and where needed. This deficiency detracts from the validity of the results, and should be addressed in the model. Accurately allocating labor resources within the model will require the development of process flow charts, precedence network diagrams, time standards and work allowances, and line balancing and manpower models. A process flow chart provides graphic representation of the work performed on a product as it passes through each stage of a process, including quantity, distance moved, type of work done, and equipment used. A precedence network diagram graphically depicts the discrete tasks within each work element, the predecessors, successors, restrictions, and limitations on each task, and logically connects them in parallel or series to show how the work could be structured. Time standards can then be developed for each task by using the K Basins studies performed last year, industrial engineering handbooks and texts, and Department of Defense work measurements and standards. Work allowances are applied to cover the use of personnel protective equipment, personnel fatigue and mental stress, radiation exposure and environmental conditions, etc. Then the line balancing and manpower modeling optimizes the work process and allocates the labor resources. This information can be incorporated into the Witness model to further improve the accuracy of the simulation and validity of the results.

4.0 DETAILED DISCUSSION

Witness is a simulation programming language used to build computer models of queuing systems. The SNF project simulation is a closed system with a set amount of serving devices moving through a series of processes. Each of these processes may be seen as a simple queuing model. Each of these simple models consist of a single process containing a piece or group of equipment performing some sort of service on demand. "Customers" come up to this "server" at random times, wait their turn (if necessary) for service, are served on a first-come-first-served basis, then leave. This situation depicted schematically in Figure 4.1 in which the row of circles represents waiting customers, the square represents the server, and the circle within the square represents the customer currently being served.

Figure 4.1. Illustration of a One-line, One Server Queuing System.

The line formed by those waiting for service is termed a "queue". The configuration consisting of the server, the customer being served, and those waiting to be served, is termed a "queuing system".

The simple system shown in Figure 1.1 is characterized by two independent random variables. The time between consecutive arrivals of customers to the system, often called the "interval time," is a random variable. Time required for the server to perform a service is also a random variable and termed "service time". The distributions followed by these two independent random variables influence system properties and are listed below.

1. Number of customers who arrive for service during a given time span.
2. Number of customers who are able to go immediately into service when they arrive.
3. Average time customers spend in the queue.
4. Average length of the queue.
5. Maximum length of the queue.
6. Server's utilization; that is the fraction of the time that the server spends providing service during a given time span. System properties such as these are of special interest when economic considerations or project milestones are involved.

Analyzing the SNF Project is a series of simple models that are integrated into a larger system, adding complexity because of the interaction between each model. Additional constraints are added because of the interaction to the queuing system, consequently increasing its complexity.

Discrete simulation occurs when the dependent system variables change at specified points in simulated time. The time variable may be either continuous or discrete in such a model. Depending on whether the discrete changes in the dependent variable can occur at any time or only at specified times.

Running a discrete simulation model on a computer is in essence a complex sampling experiment. Thus the procedures for designing and analyzing simulation runs are similar to the techniques used in other scientific experiments. The main difference is that the simulation analyst has greater control over the experimental conditions. An appropriate statistical analysis is necessary (1) use simulation-generated data efficiently in the estimation of system performance measures and (2) reveal the scope and limitations of the conclusions based on the data.

It is necessary to characterize the random variables of a system by particular probability distributions when formulating a simulation model. When selecting an appropriate distribution for an input process, the analyst must understand some of the basic properties of common distributions and the circumstances in which those distributions arise. Initially a uniform distribution was used to examine the system response. This distribution is often used as a first approximation when the real quantity varies between two values but little else is known. Following the initial model development a triangular distribution was selected because of confidence that a minimum, maximum and a most likely value - mode could be established.

The schematic of the SNFP system shown in Figure 4.2 and process cycle times and efficiencies from Table 4 were used to develop the base model. Additionally, startup of K West basins are delayed three months from the startup of K West basins and the hot conditioning stations start nine months after, K West. Table 4 lists each process involved, a description of what's included in the cycle time, the operating efficiency, the distribution type, mid, mode and max hours for each process, and the process work week.

Figure 4.2. Spent Nuclear Fuel Project Schematic Used for Witness Modeling.

All cases examined have a learning curve factored into the model. The learning curve is 3 months for K East and 6 months for K West. Table 2 and Table 3 shows a breakdown of the hours worked per day for each month of the learning curve.

Table 2. Ramp-up cycle for K West basin.

Month	1	2	3	4	5	6	7
Hrs work	2	5	8	11	14	17	18
Hrs Rest	22	19	16	13	10	7	6
Hrs delay	0	720	1440	2184	2904	3624	4368

Table 3. Ramp-up cycle for K East basin.

Month	1	2	3	4	5	6	7
Hrs work	0.00	0.00	0.00	3	9	15	18
Hrs Rest	0.00	0.00	0.00	21	15	9	6
Hrs delay	0.00	NA	NA	2184	2904	3624	4368

4.1 BASE CASE (THREE 8 HR SHIFTS/DAY, 5 DAYS/WEEK)

In the base model all processes are based on a five day work week except for cold vacuum drying and the hot vacuum conditioning, they have a seven day work week. Each process operates 3 shifts/day assuming schedules achieve 18 hrs of system operation per 24 hr day.

The operating efficiency for all systems is approximately 70% except the crane in the CSB loadin/loadout pit (95%) and the MHM (90%). The cycle times for each process and a description of what's included in the cycle times are shown in Table 4.

The base model has one fuel retrieval line and one MCO loading station in each basin. There is one transportation device that picks up the MCO's from either the East or West basin and transports it to one of the six available vacuum drying stations. From vacuum drying there is another transporter that takes the MCO to the loadin/loadout pit at the CSB and a third transporter that takes empty MCO's back to the basin. There is one crane in the CSB that removes the MCO from the cask and one material handling machine for placing the MCO's into hot conditioning or storage. Finally there are six hot conditioning stations in an annex attached to the CSB.

Figure 4.3 Is a representation of the percentage of time that each machine was busy processing the fuel, blocked and waiting to release a MCO or breakdown.

Figure 4.3. Base Case Machine Usage.

Table 4. Spent Nuclear Fuel Project Element Time Cycles used for Model Development.

Process Name	Cycle Time Description	Operating efficiency	Dist. Type min/mode/max		Work Week
Transport new MCO from CSB to basin	Time to transfer new MCO cask from just outside the CSB to just outside the basin Loadout area door.	70%	Triangular 0.5 / 1 / 4		5 days/week 3 shifts/day 3 shifts/day
Fuel Retrieval	Time to produce the equivalent of one MCO of fuel baskets placed in the basin queue.	70%	Triangular 36 / 37 / 50		5 days/week 3 shifts/day
Cask Loadin/ Loadout	Time basin loadout area is occupied by a single MCO/Cask. Includes transport entering basin loadout area door, placing cask in loadout pit, loading baskets in MCO, placing shield plug on MCO, returning MCO to transport, removing transport from loadout area, and preparing to receive next empty cask/MCO at basin.	70%	Triangular 12 / 16.9 / 26		5 days/week 3 shifts/day
Transport MCO from Basin to Cold Vacuum Drying	Time to transfer MCO/Cask from just outside basin door to just outside entry point of a Vacuum Drying station within the 100 K Area.	70%	Triangular 0.1 / 0.25 / 0.5		5 days/week 3 shifts/day
K Basin Vacuum Drying Stations, includes welding	Time a single Vacuum Drying station is occupied by a MCO. Includes time to bring MCO/Cask from entry point into station, secure MCO/Cask in station, weld shield plug on MCO, complete pre-processing attachments, complete the actual drying cycle, test the MCO weld based on 63 hr base cycle time, remove the dried MCO/Cask from the station to just outside the drying station entry point, and prepare the drying station to receive another MCO/Cask, includes short drying time for good fuel in minimum, long drying time for weld repair in maximum.	70%	Triangular 74 / 84 / 113		7 days/week 3 shifts/day
Transport MCO from 100K to 200E Area	Time to move the MCO/Cask from just outside a Vacuum Drying station located in the 100 K Area to a point just outside the Canister Storage Building entry point located in the 200 E Area	70%	Triangular 0.5 / 1 / 4		5 days/week 3 shifts/day
CSB MCO/Cask Loadin/ Loadout	Time the CSB cask loadin/loadout area is occupied by a single cask. Includes transport entering the building with a loaded MCO/Cask from just outside the CSB entry point, off loading the cask to the service pit, vent and purge of the MCO, removal of MCO from the cask by the MHM, insertion of a new MCO in the cask, returning the cask to the transport, ready the transport for hookup, and any preparations of the CSB loadin/loadout area for receipt of the next cask.	95%	Triangular 10.4 / 11.4 / 13.4		5 days/week 3 shifts/day
MCO/MHM Transfer to Staging	Time the MHM is occupied with transfer of a MCO from the CSB service pit to placement in a staging tube. Includes moving the MHM to a position over the cask in the service pit for removal of a MCO, removal of the MCO from the cask, moving the MHM/MCO to a staging tube, placing the MCO in the tube, and any other time the MHM is used to support placing that specific MCO in staging until it is free to move another MCO.	90%	Triangular 3 / 3.25 / 4		5 days/week 3 shifts/day
MCO/MHM Transfer to Conditioning	Time the MHM is occupied with transfer of a MCO from a staging tube to Hot Vacuum Conditioning. Includes moving the MHM to a staging tube position, removing the MCO from the tube, moving the MHM/MCO to a Hot Vacuum Conditioning station, placing the MCO in the station, and any other time the MHM is used to support moving that specific MCO to a Hot Vacuum Conditioning station until it is free to move another MCO.	90%	Triangular 3 / 3.25 / 4		5 days/week 3 shifts/day
Hot Vacuum Conditioning Stations	Time a single Hot Vacuum Conditioning station is occupied by a MCO. Includes time to place MCO in a station by the MHM, cooling and pre-processing hookups, complete the actual conditioning cycle, inserting and closure of the MCO, removal of the MCO from a station by the MHM, and any preparation of the conditioning station to receive another MCO.	70%	80% of MCO	20% of MCO	7 days/week 3 shifts/day
MCO/MHM Transfer from Conditioning	Time the MHM is occupied with transfer of a MCO from a Hot Vacuum Conditioning station to an interim storage tube. Includes moving the MHM to a conditioning station, removal of the MCO from the station, moving the MHM/MCO to an interim storage tube, placing the MCO in the tube, and any other time the MHM is used to support placing that specific MCO in interim storage until it is free to move another MCO.	90%	Triangular 3 / 3.25 / 4		5 days/week 3 shifts/day

4.2 CASE 1. TWO 12 HR SHIFTS/DAY, 5 DAYS/WEEK.

Case 1 has the same operating efficiency and number of stations as the base case. There are two shifts in case 1 operating 12 hrs/day to achieve 20 hrs production in a 24 hr day.

Figure 4.4 Is a representation of the percentage of time that each machine was busy processing the fuel, blocked and waiting to release a MCO or breakdown.

Figure 4.4. Case 1 Machine Usage.

4.3 CASE 2. THREE 8HR SHIFTS/DAY, 5 DAYS/WEEK. FUEL RETRIEVAL OPERATING AT 90% EFFICIENCY.

Case 2 has the same number of stations and the same shifts as the base case but the operating efficiency of the fuel retrieval lines in both K East and K West are at 90%. All other processes have the same operating efficiency as the base case.

Figure 4.5 Is a representation of the percentage of time that each machine was busy processing the fuel, blocked and waiting to release a MCO or breakdown.

Figure 4.5. Case 2 Machine Usage.

4.4 CASE 3. THREE 8HR SHIFTS/DAY, 5 DAYS/WEEK. FUEL RETRIEVAL OPERATING AT 80% EFFICIENCY.

Case 3 has the same number of stations and the same shifts as the base case but the operating efficiency of the fuel retrieval lines in both K East and K West are at 80%. All other processes have the same operating efficiency as the base case.

Figure 4.6 Is a representation of the percentage of time that each machine was busy processing the fuel, blocked and waiting to release a MCO or breakdown.

Figure 4.6. Case 3 Machine Usage.

4.5 CASE 4. THREE 8 HR SHIFTS/DAY, 5 DAYS/WEEK. FUEL RETRIEVAL CYCLE TIMES OF MIN = 16, MODE = 17, AND MAX = 30.

Case 4 has the same operating efficiencies, the same shifts and the same number of stations as the base case. The fuel retrieval cycle has the same triangular distribution with the min, mode, and max of 16, 17, and 30 hr, respectively.

Figure 4.7 Is a representation of the percentage of time that each machine was busy processing the fuel, blocked and waiting to release a MCO or breakdown.

Figure 4.7. Case 4 Machine Usage.

4.6 CASE 5. THREE 8 HR SHIFTS/DAY, 5 DAYS/WEEK. WITH LONG REPAIR TIMES ON FUEL RETRIEVAL, MHM, AND HOT CONDITIONING.

Case 5 has the same operating efficiencies, the same shifts and the same number of stations as the base case. The time to repair various machines was increased and the interval between breakdowns was also increased to keep the operating efficiency at 70%. The repair time for fuel retrieval went from 17 to 23 hrs, the MHM went from 6 to 15 hrs, and hot conditioning went from 60 to 120 hrs.

Figure 4.8 Is a representation of the percentage of time that each machine was busy processing the fuel, blocked and waiting to release a MCO or breakdown.

Figure 4.8. Case 5 Machine Usage.

4.7 CASE 6. THREE 8 HR SHIFTS/DAY, 7 DAYS/WEEK.

Case 6 is used as a base model for 7 day/week operations. All processes are based on a seven day work week. Each process operates 3 shifts/day assuming achieve 18 hrs of system operation per 24 hr day.

The operating efficiency for all systems is approximately 70% except for the crane in the CSB loadin/loadout pit (95%) and the MHM (90%). The cycle times for each process and a description of what's included in the cycle times are shown in Table 4.

Case 6 model has one fuel retrieval line and one MCO loading station in each basin. There is one transportation device that picks up the MCO's from either the East or West basin and transports it to one of the six available vacuum drying stations. From vacuum drying there is another transporter that takes the MCO to the loadin/loadout pit at the CSB and a third transporter that takes empty MCO's back to the basin. There is one crane in the CSB that removes the MCO from the cask and one material handling machine for placing the MCO's into hot conditioning or storage. Finally there are six hot conditioning stations available in an annex attached to the CSB.

Figure 4.9 Is a representation of the percentage of time that each machine was busy processing the fuel, blocked and waiting to release a MCO or breakdown.

Figure 4.9. Case 6 Machine Usage.

4.8 CASE 7. TWO 12 HR SHIFTS/DAY, 7 DAYS/WEEK.

Case 7 has the same operating efficiency and number of stations as case 6. There are two shifts in case 7 operating 12 hrs/day to achieve 20 hrs production in a 24 hr day.

Figure 4.10 Is a representation of the percentage of time that each machine is busy processing the fuel, blocked and waiting to release a MCO or breakdown.

Figure 4.10. Case 7 Machine Usage.

4.9 CASE 8. THREE 8 HR SHIFTS/DAY, 7 DAYS/WEEK. USING 5 COLD VACUUM DRYING STATIONS.

Case 8 has the same operating efficiency and the same shifts as case 6. There are only 5 cold vacuum drying stations in case 8.

Figure 4.11 Is a representation of the percentage of time that each machine was busy processing the fuel, blocked and waiting to release a MCO or breakdown.

Figure 4.11. Case 8 Machine Usage.

4.10 CASE 9. THREE 8HR SHIFTS/DAY, 7 DAYS/WEEK. USING 4 COLD VACUUM DRYING STATIONS.

Case 9 has the same operating efficiency and the same shifts as case 6. There are only 4 cold vacuum drying stations in case 9.

Figure 4.12 is a representation of the percentage of time that each machine was busy processing the fuel, blocked and waiting to release a MCO or breakdown.

Figure 4.12. Case 9 Machine Usage.

4.11 CASE 10. THREE 8HR SHIFTS/DAY, 7 DAYS/WEEK. USING 2 LOADIN/LOADOUT PITS IN THE CSB.

Case 10 has the same operating efficiency and the same shifts as case 6. There are 2 loadin/loadout pits in the CSB in case 10.

Figure 4.14 is a representation of the percentage of time that each machine was busy processing the fuel, blocked and waiting to release a MCO or breakdown.

Figure 4.14. Case 10 Machine Usage.

4.12 CASE 11. THREE 8HR SHIFTS/DAY, 7 DAYS/WEEK. USING 5 HOT CONDITIONING STATIONS.

Case 11 has the same operating efficiency and the same shifts as case 6. There are only 5 hot conditioning stations in case 11.

Figure 4.15 is a representation of the percentage of time that each machine was busy processing the fuel, blocked and waiting to release a MCO or breakdown.

Figure 4.15. Case 11 Machine Usage.

4.13 CASE 12. THREE 8HR SHIFTS/DAY, 7 DAYS/WEEK. USING 4 HOT CONDITIONING STATIONS.

Case 12 has the same operating efficiency and the same shifts as case 6. There are only 4 hot conditioning stations in case 15.

Figure 4.16 is a representation of the percentage of time that each machine was busy processing the fuel, blocked and waiting to release a MCO or breakdown.

Figure 4.16. Case 12 Machine Usage.

4.14 SNF PROCESS CYCLE TIMES

The following discussion describes the basis for cycle time estimates used to model the production of an MCO by each process element. These cycle times represent the peak throughput of each process element, or the actual work time needed to produce a MCO. Potential system down time from equipment failure or operating environment inefficiencies, is included as a separate model input parameter.

Fuel Retrieval

Fuel retrieval cycle time estimates are based on the peak capacity estimates reported in conceptual design (LATA/BNFL/Foster Wheeler, nd). Capacity estimates for a single fuel retrieval line are estimated at 9.2 canisters/day assuming 100% assembly inspection and 12.9 canisters/day assuming no inspection. Based on 14 assemblies per canister and 270 assemblies per MCO, the reported peak capacities represent cycle times ranging from 50.2 hr to 35.9 hr for producing a MCO with 100% and no inspection, respectively. Current plans anticipate inspecting every 100th assembly (1% inspection). It is assumed that the no inspection cycle time is derated by 5% of the cycle time difference between no inspection and 100% inspection to model the cycle time of current plans. This results in an estimated cycle time of 36.6 hr to produce a MCO. Based on these estimates, a triangular distribution with minimum time of 36 hr, mode time of 37 hr, and maximum time of 50 hr was used to model fuel retrieval activities.

Cold Vacuum Drying

The cycle time for a cold vacuum drying station to produce a MCO is derived from a preliminary cycle time estimate of 63 hr to produce a MCO. This was increased to incorporate time for MCO welding and increasing the MCO process temperature from 50 °C to 75 °C. A welding alternatives analysis (Goldmann 1996) estimated that MCO welding will add 14.7 hr to the drying station cycle time and weld repairs, if required, add another 9 hr to the cycle time. Time was also added to the base cycle time to heat to 75 °C (instead of 50 °C in the base estimate), hold for 1 hr at 75 °C, and cool from 75 °C. Assuming MCO temperature changes during cold vacuum drying are limited to 10 °C/hr, the operating condition changes result in adding 6 hr to the base time cycle. Finally, cycle times are expected to vary based on the condition of the fuel. A firm basis for predicting this variation is not currently available. To model the logistic impact of fuel condition variations, it was assumed good fuel could be processed with a 10 hr shorter cycle and bad fuel processed with a 20 hr longer cycle as compared to the base. These estimates result in a triangular cycle time distribution with the following characteristics:

	Base	75 °C Operating Temperature	MCO Welding	MCO Weld Repair	Fuel Condition Variation	Total Cycle Time
Minimum Time, Hr	63	+6	+15	-	-10	74
Mode Time, Hr	63	+6	+15	-	-	84
Maximum Time, Hr	63	+6	+15	+9	+20	113

Duncan 1996 presents an estimate for the minimum cold vacuum drying station cycle time of 64 hr. Therefore, the cold vacuum drying station cycle times currently used for investigating the overall project interactions appear to be conservative.

Canister Storage Building

Time cycle estimates for the cask loadin/loadout and MCO Handling Machine (MHM) transfer activities within the Canister Storage Building were derived from a draft operator exposure analysis that was available in March 1996. The exposure analysis divided the material handling actions within the CSB into 39 separate tasks, estimating the time required to complete each task. The task descriptions were reviewed and assigned to either cask loadin/loadout or identified as associated with the MHM transfer.

Based on the task time estimates, 11.4 hr is required to complete cask loadin/loadout. A triangular distribution of the loadin/loadout time was developed by assuming the vent and purge task could be reduced from 1.5 hr to 0.5 hr for some of the MCOs containing fuel in good condition. A maximum time was estimated by assuming the two decon/survey tasks identified take 1 hr instead of 0.5 hr, the pit enclosure installation takes 1.5 hr instead of 1 hr, and installation of the vent purge system takes 0.75 hr instead of 0.25 hr for some MCOs. These assumptions result in a triangular distribution estimate for CSB cask loadin/loadout with a minimum time of 10.4 hr, mode time of 11.4 hr, and maximum time of 13.4 hr.

Based on the task time estimates, 3.25 hr is estimated to be required to complete activities using the MHM to transfer a MCO from the cask pit to a tube for staging. This includes the 175 min identified in the exposure analysis task list plus 10 min to move the MHM from a neutral position in the CSB to a position over the cask and 10 min to move the MHM from the tube being loaded back to a neutral position. A minimum time for completing a transfer with the MHM was assumed to be 3 hr. A maximum time for completing the transfer was assumed to be 4 hr, based on assuming the time to inert the storage tube during the transfer takes 55 min instead of 10 min. These assumptions result in a triangular distribution estimate for the MHM transfer of a MCO with a minimum time of 3 hr, mode time of 3.25 hr, and maximum time of 4 hr.

The time cycle distributions for transfer of a MCO from a staging tube to the Hot Conditioning System (HCS) and from HCS back to a storage tube was

assumed to be equivalent to the triangular distribution based on MHM transfers from the cask pit to a storage tube.

Hot Vacuum Conditioning

Duncan 1996 includes an estimate for the minimum time cycle for a HCS station to process a MCO of 122 hr. Preliminary estimates from draft conceptual design information provide a nominal cycle time estimate of 140 hr for the HCS cycle time. Uncertainty exists as to the impact of fuel condition variability on the conditioning system cycle time. In order to provide a conservative estimate of the HCS cycle time which addresses fuel condition variability, a two point distribution of the cycle time was used to model the HCS which assumes 80% of the fuel was processed with a 140 hr cycle and 20% of the fuel was processed with a 205 hr cycle. The basis for these cycle time estimates may need to be modified upon completion of conceptual design activities.

Basin Cask Loadin/Loadout and Transportation

A preliminary exposure evaluation of the basin cask loadin/loadout activities was used as a basis for estimating the cycle time for basin cask loadin/loadout activities (Transnuclear, nd). The exposure evaluation estimated a total cycle time of 10.9 hr to prepare the cask for MCO loading (cask loadin), load the MCO, and loadout the cask. Additional conservatism was added to this cycle time estimate by increasing the MCO basket loading from 1 to 4 hr, increasing the MCO shield plug decontamination time from 0.5 to 1.5 hr, and increasing the final cask survey and decontamination time from 0.1 to 2.1 hr. The conservatism increases the loadin/loadout cycle time to 16.9 hr, which was used as the mode time of a triangular distribution for the cask cycle time.

A minimum cycle time was estimated at two shifts of operating time, or 12 hr. A maximum cycle time was estimated by tripling the time required for installing the shield plug and decon/survey activities, resulting in increasing the cask loadin/loadout time to 26 hr. These assumptions result in a triangular distribution estimate for the basin cask loadin/loadout with a minimum time of 12 hr, mode time of 16.9 hr, and maximum time of 26 hr.

Transportation time estimates are based on allocations based on the approximate distance traveled. The transfer from just outside the door at a basin to the cold vacuum drying location is approximately 1000 ft. Based on discussion with the transportation design authority, a triangular distribution with minimum time of 0.1 hr, mode time of 0.25 hr, and maximum time of 0.5 hr was used to model the transfer from the basin to just outside a cold vacuum drying station.

The transport distance from cold vacuum drying to the canister storage building is approximately 7 mi. Based on discussion with the transportation design authority, a triangular distribution with minimum time of 0.5 hr, mode time of 1 hr, and maximum time of 4 hr was used to model the transportation time required to move a MCO from just outside the cold vacuum drying station to just outside the canister storage building. This triangular time distribution was also used to model the time required to return a cask loaded with an empty MCO back to the basin.

5.0 REFERENCES

- Duncan, D. R., 1996, *Spent Nuclear Fuel Project Operational Description*, WHC-SD-SNF-RPT-010, (Rev 0), Westinghouse Hanford Company, Richland, Washington.
- Goldmann, L. H., 1996, *Multi-Canister Overpack Closure Operations Location Study*, WHC-SD-SNF-RPT-002, (Rev 0), Westinghouse Hanford Company, Richland, Washington.
- LATA/BNFL/Foster Wheeler, nd, *Fuel Retrieval Sub-Project Conceptual Design Report*, L/B-SD-SNF-RPT-009, Rev 0, Los Alamos Technical Associates/British Nuclear Fuels Limited/Foster Wheeler, Richland, Washington.
- Pajunen, A. L., 1996, *Development of Design Basis Capacity for Spent Nuclear Fuel Project Systems*, WHC-SD-SNF-TI-016, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Transnuclear, nd, "Preliminary Design Analysis Report for the TN-WHC Cask and Transportation System - Project 3035," E-14573, Transnuclear, Inc., Hawthorn, New York.

APPENDIX A
VALIDATION REQUIREMENTS

APPENDIX A

VALIDATION REQUIREMENTS

Software used by ICF Kaiser Hanford Company is controlled by Engineering Department Process Instruction number ENG-DPI-6, *Control of Engineering Software*. Commercially available (off-the-shelf) software programs must be verified and accepted by the Software Administrator, who places the software onto the "master list of programs approved for use", in accordance with Section 2, *Verification of Commercial Programs*.

Software used by Westinghouse is controlled by WHC-CM-4-2, *Quality Assurance Manual* (QR 19.0, *Software Quality Assurance Requirements*) and WHC-CM-3-10, *Software Practices*.

WHC-CM-4-2, paragraph 4.6.2 *Commercially Available (off-the-shelf)* Software says, "If the software can be used as is, the requirements of paragraph 4.4.1 shall apply." WHC-CM-4-2, paragraph 4.4.1 *Minimum Required Documentation* lists the six minimum documents that must be produced, reviewed, approved, and released according to WHC-CM-3-5, Section 12.7 *Approval of Environmental, Safety, and Quality Affecting Documents*. WHC-CM-3-5 Sec 12.7, Rev 0, Change 4, 4/10/96, indicates the appropriate Approval Designator is "NA", which means "there are no approvals required other than the cognizant engineer and cognizant manager".

Validation of this off-the-shelf software addresses only the SNF application of the process model and is not intended as overall software validation. Other groups using this software will need to validate their particular applications.

To meet the intent of the ICF KH procedures, the following verification task will be performed.

Verify that the program does the job it was intended/advertised to do.

This will be accomplished by receiving information from Istel on the internal validating and beta testing they performed and on the number of copies in use.

Verify that the program works on the user's machine just as does on the supplier's machine.

This will be done by running a demonstration model on Istel's computer, then running the same model on our computer, and comparing the results.

Verify that the user has applied the software correctly.

This will be done by an ongoing review of the reasonableness of the output of each scenario by some or all of the contributors, and modifying the model where necessary to produce an output within the expected range.

Verify that the user has input the variables as intended.

This will be done by checking the input stream for the intended values of the variables for each scenario.

To meet the intent of the WHC procedures six items require documentation as follows:

Software Requirements

The Witness software package is intended to be used as a simulation program to model the SNF project and subprojects. The simulation program must be capable of performing "what if" scenarios when analyzing method or process alternatives, performing time and motion studies, determining queuing sizes and frequencies, determining problem elimination or learning curves, evaluating flow restrictions and plant and work station layout, incorporating machine breakdown cycles and repair times, and including workstation staffing. Suitability of this program to satisfy these requirements was based on recommendations of previous on-site users, and on vendor supplied promotional information.

Witness is a commercially available off-the-shelf software; it will not be modified and it will not be incorporated into the development of other software. The use of this software does not invoke or address any health or safety issues.

User Documentation

User documentation for the software package was developed and distributed by the software vendor.

Modeling for this application was based on the flow diagram shown in figure 4.2 and the operating efficiencies and cycle times listed in table 4. Each machine or queue was input into the model along with the proper logic ties to create a representation of the SNF project.

Appendix B is the input file for the base case used in this study.

Test Case Specification

There was no formal test case specification prepared for this study. In various meetings with the software administrator, design authorities and responsible engineers it was decided that the design authority and the responsible project engineers would review input to the model and determine if the desired results were obtained.

Test Procedure Specification

As new items or features were added to the base model the output was checked to see if the expected results were obtained. Both the responsible engineer and the design authority checked the output against the SNF operating baseline. If the output didn't represent the actual SNF processes the logic

was examined and revised to characterize system operations. A couple of examples of how modeling didn't represent the base system and how it was changed are listed below.

In one example, the cold vacuum drying stations release an MCO to the transporter to 200 East. Then the transporter would take the MCO to the CSB and unload it. In reviewing the output it was found that if the CSB loadin/loadout pit was busy or blocked the truck would wait until it was open then release the MCO, in affect making the truck into a queue. In the actual system the cold vacuum drying is the queue and will not release an MCO if the CSB is blocked or busy so the logic was modified to reflect actual system operations.

A second example is the learning curve ramp-up cycle. The ramp-up cycle was created by defining the hours worked per day for each month during the ramp-up cycle and hours worked per day for steady state operations. While running the model it was found that instead of repeating the steady state month after the ramp-up was complete, the complete ramp-up cycle was repeated for the duration of the project. New logic was written to repeat only the steady state month, thus simulating the proper shift schedules.

Test Results

The final version of the base model was reviewed by the design authority and the responsible engineer and was found to accurately represent the overall SNF project.

Software Configuration Control Plan

Witness is a proprietary software program for which we do not modify the code. The vendor develops and distributes any required software modifications, along with any related modifications to the user documentation. The modified software and documentation is distributed to the code custodian of the registered owner of the program. The code custodian controls the disks and the software access key, and keeps track of who has the software installed on their machine so it can be updated as necessary.

APPENDIX B
WITNESS OUTPUT

BASE CASE (THREE 8 HR SHIFTS/DAY, 5 DAYS/WEEK)

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week

Number of cold vacuum operations

Number of hot conditioning operations

B-3

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week

Time machine is in use

B-4

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week

! WITNESS MODEL: SNF5BASE

Base Model - 5 days/wk 18 hrs/day

CLOCK

UNIT : Hours;
MULTIPLE : 1,Day,24,0;
MULTIPLE : 2,Week,7,0;
MULTIPLE : 3,,0,0;
RATIO : 1:1;
DISPLAY : USER;
END CLOCK

DETAIL

OPTIONS

BREAKDOWN MODEL: Mean;
PRN Stream : 1;
REPAIR MODEL: Actual;
LABOR TO UNLOAD : No;
WARMUP PERIOD : 0.00;
OUTPUT INTERVAL : None;
UNBLOCK BASIS : Priority;
MONITOR STEP : Undefined;
MIXTURE STEP : Undefined;
MODULE ELEMENT NAMES : Use local preferences;
END OPTIONS

SELECT

CskLoadM

NAME OF MACHINE: CskLoadM;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END

DISCRETE LINKS :
Fill: None

END

DISCRETE LINKS :
Empty: None

END

CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);

BREAKDOWN_DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Finish

Add

CHANGE ALL to mco_cask
countmco (1) = countmco (1) + 1
IF countmco (1) = 200
DESC = "LstW"

Done (3) = TIME
ENDIF
End Actions
INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(1)#(1),
CaskBuf#(1);
OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLdMS,0,0;

END CskLoadM

Vacuum

NAME OF MACHINE: Vacuum;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END

DISCRETE LINKS :
Fill: None

END

DISCRETE LINKS :
Empty: None

END

CYCLE TIME: TRIANGLE (74,84,113,N + 6);

BREAKDOWN_DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 40.0;
* Repair time: 40.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Finish

Add

Note that its the first time through

PEN = 1

VacNOps (1) = NOPS (Vacuum(1))
VacNOps (2) = NOPS (Vacuum(2))
VacNOps (3) = NOPS (Vacuum(3))
VacNOps (4) = NOPS (Vacuum(4))
VacNOps (5) = NOPS (Vacuum(5))
VacNOps (6) = NOPS (Vacuum(6))
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (1) = LastMCO (1) + 1

Done (6) = TIME

ENDIF

End Actions

INPUT RULE: Wait;
OUTPUT RULE: IF ISTATE (CSBCask) = 1
PUSH to Tx1Kto2E
ELSE
Wait
ENDIF;

REPORTING: Individual;
SHIFT: VDShift,0,0;

END Vacuum

MHC-SD-SNF-RPT-011
Rev. 0

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MCO

NAME OF PART: MCO;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: END
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END MCO

FuelBasQ

NAME OF HISTOGRAM: FuelBasQ;
QUANTITY: 1;
STATS RESET: Yes;

END FuelBasQ

BasinBuf

NAME OF BUFFER: BasinBuf;
QUANTITY: 2;
CAPACITY: 2;
DELAY MODE: None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add
I RECORD NPARTS (BasinBuf(2)) in FuelBasQ
ftotobs = INHUM (FuelBasQ)
icellone = INCELL (FuelBasQ,1)
ionepe = cellone / totobs
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END BasinBuf

FuelRetW

NAME OF MACHINE: FuelRetW;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: TRIANGLE (36,37,50,W);
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 17.0;
* Scrap part: No;
* Description: Breakdown Number 1

```

```

* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Start
Add
Supply (1) = Supply (1) - 1
End Actions
ACTIONS, Finish
Add
IF Supply (1) = 0
Done (1) = TIME
ENDIF
End Actions
INPUT RULE: IF Supply (1) > 0
PULL from MCO out of WORLD
ELSE
Wait
ENDIF;
OUTPUT RULE: PUSH to BasinBuf(1);
REPORTING: Individual;
SHIFT: Wshift,0,0;

END FuelRetW

basbufpc

NAME OF VARIABLE: basbufpc;
QUANTITY: 1;
REPORTING: Yes;

END basbufpc

Tx1Kto2E

NAME OF MACHINE: Tx1Kto2E;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: TRIANGLE (0.5,1,4,13);
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 150.0;
* Repair time: 3.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add

```

```

IF DESC = "LstW" OR DESC = "LstE"
  LastMCO (2) = LastMCO (2) + 1
  Done (7) = TIME
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to CSBCask;
REPORTING: Individual;
SHIFT: Tx1K2ES,0,0;

END Tx1KTo2E

MHMTx

NAME OF MACHINE: MHMTx;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (3,3.25,4,15);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 150.0;
  * Repair time: 6.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
  LABOR:
    Repair: None;
  END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
  IF PEN = 3
    Complete = Complete + 1
    IF NWIP (MCO) = 1 !all MCO's are complete
      STOP
    ENDIF
  ENDIF
End Actions
INPUT RULE: IF ISTATE (HotCond(1)) = 0
  Wait
ELSE
  IF NPARTS (HotCond) > 5
    PULL from HotCond
  ELSE
    PULL from CSB
  ENDIF
ENDIF;
OUTPUT RULE: SELECT on PEN CSB,HotCond,SHIP;
REPORTING: Individual;
SHIFT: Days5,0,0;

END MHMTx

FuelRetE

```

```

NAME OF MACHINE: FuelRetE;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (36,37,50,N);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 35.0;
  * Repair time: 17.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
  LABOR:
    Repair: None;
  END
END BREAKDOWN_DETAIL
ACTIONS, Start
Add
  Supply (2) = Supply (2) - 1
End Actions
ACTIONS, Finish
Add
  IF Supply (2) = 0
    Done (2) = TIME
  ENDIF
End Actions
INPUT RULE: IF Supply (2) > 0
  PULL from MCO out of WORLD
ELSE
  Wait
ENDIF;
OUTPUT RULE: PUSH to BasinBuf(2);
REPORTING: Individual;
SHIFT: EShift,0,0;

END FuelRetE

CSBCask

NAME OF MACHINE: CSBCask;
QUANTITY: 1;
TYPE: Production;
* Part type: EmpCask;
* Production qty: 1;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END

```

```

CYCLE TIME: TRIANGLE (10.4,11.4,13.4,14);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 300.0;
  * Repair time: 6.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
  LABOR:
    Repair: None;
  END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
  CHANGE mco.cask to MCO
  IF DESC = "LstW" OR DESC = "LstE"
    LastMCO (3) = LastMCO (3) + 1
  ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH EmpCask to TxToCskB,MCO to MHMTx;
REPORTING: Individual;
SHIFT: CSBCaskS,0,0;
END CSBCask

HotCond
NAME OF MACHINE: HotCond;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: HC.CTime;
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Busy time;
  * Down interval: 40.0;
  * Repair time: 60.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
  LABOR:
    Repair: None;
  END
END BREAKDOWN_DETAIL
ACTIONS, Start
Add
  x = RANDOM (98)
  IF x < 0.8
    HC.CTime = 140
  ELSE
    HC.CTime = 205
  ENDIF
End Actions

```

```

ACTIONS, Finish
Add
  PEN = 3
  HCNops (1) = NOPS (HotCond(1))
  HCNops (2) = NOPS (HotCond(2))
  HCNops (3) = NOPS (HotCond(3))
  HCNops (4) = NOPS (HotCond(4))
  HCNops (5) = NOPS (HotCond(5))
  HCNops (6) = NOPS (HotCond(6))
  IF DESC = "LstW" OR DESC = "LstE"
    Done (8) = TIME
  ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to MHMTx;
REPORTING: Individual;
SHIFT: DelayHC,0,0;
END HotCond

Days5E
NAME OF SHIFT: Days5E;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 2184.000000;
SHIFT DATA: SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5We;
REPORTING: Yes;
END Days5E

onepc
NAME OF VARIABLE: onepc;
QUANTITY: 1;
REPORTING: Yes;
END onepc

totobs
NAME OF VARIABLE: totobs;
QUANTITY: 1;
REPORTING: Yes;
END totobs

CSB
NAME OF BUFFER: CSB;
QUANTITY: 1;
CAPACITY: 1000;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add
  Imake it its second pass
  PEN = 2

```

```

End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END CSB

cellone

NAME OF VARIABLE: cellone;
QUANTITY: 1;
REPORTING: Yes;

END cellone

CskLoadE

NAME OF MACHINE: CskLoadE;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (12,16,9,26,N + 4);
BREAKDOWN DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 35.0;
  * Repair time: 7.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
  LABOR:
    Repair: None;
  END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add
  CHANGE ALL to mco_cask
  countmco (2) = countmco (2) + 1
  IF countmco (2) = 200
    Done (4) = TIME
    DESC = "LstE"
  ENDIF
End Actions
INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(2)#(1),
  CaskBuf#(1);
OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLoadE,0,0;

END CskLoadE

Days5

NAME OF SHIFT: Days5;
TYPE OF SHIFT: main;
OFFSET:

```

```

Working time: 0.000000;
Rest time: 0.000000;
ACTIONS, End
Add
  IF Done (3) > 1 AND ISTATE (CskLoadW) <> 3
    CskLoadW = Woff
  ENDIF
  IF Done (4) > 1 AND ISTATE (CskLoadE) <> 3
    CskLoadE = Eoff
  ENDIF
  IF countmco (1) = 200 AND countmco (2) = 200
    TxToCVD = Eoff
  ENDIF
  IF LastMCO (1) = 2 AND ISTATE (Vacuum(1)) <> 3
    VDShift = Eoff
  ENDIF
  IF LastMCO (2) = 2 AND ISTATE (Tx1KToZE) <> 3
    Tx1KZES = Eoff
  ENDIF
  IF LastMCO (3) = 2 AND ISTATE (CSBCask) <> 3
    CSBCaskS = Eoff
  ENDIF
  IF LastMCO (4) = 2 AND ISTATE (TxToCskB) <> 3
    TxToCskBS = Eoff
  ENDIF
End Actions
SHIFT DATA: SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
REPORTING: Yes;

END Days5

Complete

NAME OF VARIABLE: Complete;
QUANTITY: 1;
REPORTING: Yes;

END Complete

Supply

NAME OF VARIABLE: Supply;
QUANTITY: 2;
REPORTING: Yes;

END Supply

TxToCVD

NAME OF MACHINE: TxToCVD;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None

```

```

END
CYCLE TIME: TRIANGLE (0.1,0.25,0.5,13);
BREAKDOWN DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 150.0;
  * Repair time: 0.5;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add
  IF countmco (1) = 200 AND countmco (2) = 200
    Done (5) = TIME
  ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to Vacuum;
REPORTING: Individual;
SHIFT: TxToCvds,0,0;
END TxToCvD

DelayHC

NAME OF SHIFT: DelayHC;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 6552.000000;
SHIFT DATA: 168.000000,0.000000,0.000000;
REPORTING: Yes;

END DelayHC

Done

NAME OF VARIABLE: Done;
QUANTITY: 8;
REPORTING: Yes;

END Done

VdryUse

NAME OF HISTOGRAM: VdryUse;
QUANTITY: 1;
STATS RESET : Yes;

END VdryUse

CaskBuf

NAME OF BUFFER: CaskBuf;
QUANTITY: 1;
CAPACITY: 100;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In

```

```

Add
IRECORD NPARTS (CaskBuf) in CaskBufQ
Itotobs = INNUM (CaskBufQ)
Icellone = IHCCELL (CaskBufQ,1)
Ionepc = cellone / totobs
End Actions
ACTIONS, Out
Add
RECORD 9 - NPARTS (CaskBuf) in CaskBufQ
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END CaskBuf

EmpCask

NAME OF PART: EmpCask;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 9;
INTER ARRIVAL TIME: Undefined;
FIRST ARRIVAL AT: 0.0;
LOT SIZE: 9;
OUTPUT RULE: PUSH to CaskBuf;
PART ROUTE: None
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END EmpCask

mco_cask

NAME OF PART: mco_cask;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: None
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END mco_cask

TxToCskB

NAME OF MACHINE: TxToCskB;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (0.5,1,4,13);
BREAKDOWN DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 150.0;

```

```

* Repair time: 3.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add
  LastMCO (4) = LastMCO (3)
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to CaskBuf;
REPORTING: Individual;
SHIFT: TxCskBS,0,0;
END TxToCskB

CaskTot
NAME OF VARIABLE: CaskTot;
QUANTITY: 1;
REPORTING: Yes;
END CaskTot

No_CaskW
NAME OF VARIABLE: No_CaskW;
QUANTITY: 1;
REPORTING: Yes;
END No_CaskW

No_CaskE
NAME OF VARIABLE: No_CaskE;
QUANTITY: 1;
REPORTING: Yes;
END No_CaskE

HC_CTime
NAME OF VARIABLE: HC_CTime;
QUANTITY: 1;
REPORTING: Yes;
END HC_CTime

x
NAME OF VARIABLE: x;
QUANTITY: 1;
REPORTING: Yes;
END x

CaskBufQ
NAME OF HISTOGRAM: CaskBufQ;
QUANTITY: 1;
STATS RESET : Yes;

```

```

END CaskBufQ

FRWest
NAME OF LABOR: FRWest;
QUANTITY no shift: 1;
REPORTING: Yes;
END FRWest

countmco
NAME OF VARIABLE: countmco;
QUANTITY: 4;
REPORTING: Yes;
END countmco

VacNOps
NAME OF VARIABLE: VacNOps;
QUANTITY: 6;
REPORTING: Yes;
END VacNOps

SD5_1day
NAME OF SHIFT: SD5_1day;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;
END SD5_1day

SD5We
NAME OF SHIFT: SD5We;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 0.000000,48.000000,0.000000;
REPORTING: Yes;
END SD5We

HCNOps
NAME OF VARIABLE: HCNOps;
QUANTITY: 6;
REPORTING: Yes;
END HCNOps

WRU1_Day
NAME OF SHIFT: WRU1_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 2.000000,22.000000,0.000000;

```

REPORTING: Yes;

END WRU1_Day

WRU2_Day

NAME OF SHIFT: WRU2_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 5.000000,19.000000,0.000000;
REPORTING: Yes;

END WRU2_Day

WRU3_Day

NAME OF SHIFT: WRU3_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 8.000000,16.000000,0.000000;
REPORTING: Yes;

END WRU3_Day

WRU4_Day

NAME OF SHIFT: WRU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 11.000000,13.000000,0.000000;
REPORTING: Yes;

END WRU4_Day

WRU5_Day

NAME OF SHIFT: WRU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 14.000000,10.000000,0.000000;
REPORTING: Yes;

END WRU5_Day

WRU6_Day

NAME OF SHIFT: WRU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 17.000000,7.000000,0.000000;
REPORTING: Yes;

END WRU6_Day

WRU7_Day

NAME OF SHIFT: WRU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END WRU7_Day

ERU4_Day

NAME OF SHIFT: ERU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 3.000000,21.000000,0.000000;
REPORTING: Yes;

END ERU4_Day

ERU5_Day

NAME OF SHIFT: ERU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 9.000000,15.000000,0.000000;
REPORTING: Yes;

END ERU5_Day

ERU6_Day

NAME OF SHIFT: ERU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 15.000000,9.000000,0.000000;
REPORTING: Yes;

END ERU6_Day

ERU7_Day

NAME OF SHIFT: ERU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END ERU7_Day

ERU4_Mon

NAME OF SHIFT: ERU4_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU4_Day

101 APRIL 1991

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WRU1_Day
SD5We
WRU1_Day
WRU1_Day
WRU1_Day
WRU1_Day
SD5We
WRU1_Day
WRU1_Day
WRU1_Day
WRU1_Day
SD5We
WRU1_Day
WRU1_Day
WRU1_Day
WRU1_Day
SD5We
WRU1_Day
WRU1_Day;
REPORTING: Yes;

END WRU1_Mon

WRU2_Mon

NAME OF SHIFT: WRU2_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU2_Day
WRU2_Day
WRU2_Day
WRU2_Day
SD5We
WRU2_Day
WRU2_Day
WRU2_Day
WRU2_Day
SD5We
WRU2_Day
WRU2_Day
WRU2_Day
WRU2_Day
SD5We
WRU2_Day
WRU2_Day
WRU2_Day
WRU2_Day
SD5We
WRU2_Day
WRU2_Day
WRU2_Day
WRU2_Day
SD5We
WRU2_Day
WRU2_Day;
REPORTING: Yes;

END WRU2_Mon

WRU3_Mon

NAME OF SHIFT: WRU3_Mon;

```

```

TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU3_Day
WRU3_Day
WRU3_Day
WRU3_Day
SD5We
WRU3_Day
WRU3_Day
WRU3_Day
WRU3_Day
SD5We
WRU3_Day
WRU3_Day
WRU3_Day
WRU3_Day
SD5We
WRU3_Day
WRU3_Day
WRU3_Day
WRU3_Day
SD5We
WRU3_Day
WRU3_Day;
REPORTING: Yes;

END WRU3_Mon

WRU4_Mon

NAME OF SHIFT: WRU4_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
SD5We
WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
SD5We
WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
SD5We
WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
SD5We
WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
SD5We

```

WRU4_Day
WRU4_Day;
REPORTING: Yes;
END WRU4_Mon

WRU5_Mon

NAME OF SHIFT: WRU5_Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU5_Day

WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SD5We
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SD5We
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SD5We
WRU5_Day
WRU5_Day
WRU5_Day;
REPORTING: Yes;

END WRU5_Mon

WRU6_Mon

NAME OF SHIFT: WRU6_Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU6_Day

WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SD5We
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SD5We
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SD5We
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day

WRU6_Day
SD5We
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SD5We
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day;
REPORTING: Yes;

END WRU6_Mon

WRU7_Mon

NAME OF SHIFT: WRU7_Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU7_Day

WRU7_Day
WRU7_Day
WRU7_Day
WRU7_Day
SD5We;
REPORTING: Yes;

END WRU7_Mon

WRetSh

NAME OF SHIFT: WRetSh;
TYPE OF SHIFT: main;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
ACTIONS, End

Add

IF TIME > 4368
Wshift = WshRep
IF Done (1) > 1
Wshift = Woff
ENDIF
ENDIF

End Actions

SHIFT DATA: WRU1_Mon

WRU2_Mon
WRU3_Mon
WRU4_Mon
WRU5_Mon
WRU6_Mon;
REPORTING: Yes;

END WRetSh

EretSh

NAME OF SHIFT: EretSh;
TYPE OF SHIFT: main;
OFFSET:

Working time: 0.000000;
Rest time: 2184.000000;
ACTIONS, End

```

Add
  IF TIME > 4368
    EShift = EShRep
    IF Done (2) > 1
      EShift = Eoff
    ENDIF
  ENDIF
End Actions
SHIFT DATA: ERU4_Mon
ERU5_Mon
ERU6_Mon;
REPORTING: Yes;

END ERetSh

Wshift
NAME OF VARIABLE: Wshift;
QUANTITY: 1;
REPORTING: Yes;

END Wshift

WShRep
NAME OF SHIFT: WShRep;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: WRU7_Mon;
REPORTING: Yes;

END WShRep

EShRep
NAME OF SHIFT: EShRep;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: ERU7_Mon;
REPORTING: Yes;

END EShRep

EShift
NAME OF VARIABLE: EShift;
QUANTITY: 1;
REPORTING: Yes;

END EShift

Eoff
NAME OF SHIFT: Eoff;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 0.000000,168.000000,0.000000;
REPORTING: Yes;

END Eoff

```

```

Woff
NAME OF SHIFT: Woff;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 0.000000,168.000000,0.000000;
REPORTING: Yes;

END Woff

Days7
NAME OF SHIFT: Days7;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 168.000000,0.000000,0.000000;
REPORTING: Yes;

END Days7

VShift
NAME OF VARIABLE: VShift;
QUANTITY: 1;
REPORTING: Yes;

END VShift

CskLdWS
NAME OF VARIABLE: CskLdWS;
QUANTITY: 1;
REPORTING: Yes;

END CskLdWS

CskLdES
NAME OF VARIABLE: CskLdES;
QUANTITY: 1;
REPORTING: Yes;

END CskLdES

TxToCVDS
NAME OF VARIABLE: TxToCVDS;
QUANTITY: 1;
REPORTING: Yes;

END TxToCVDS

Tx1K2ES
NAME OF VARIABLE: Tx1K2ES;
QUANTITY: 1;
REPORTING: Yes;

END Tx1K2ES

CSBCaskS

```

```
NAME OF VARIABLE: CSBCaskS;  
QUANTITY: 1;  
REPORTING: Yes;
```

```
END CSBCaskS
```

```
TxCskBS
```

```
NAME OF VARIABLE: TxCskBS;  
QUANTITY: 1;  
REPORTING: Yes;
```

```
END TxCskBS
```

```
LastMCO
```

```
NAME OF VARIABLE: LastMCO;  
QUANTITY: 4;  
REPORTING: Yes;
```

```
END LastMCO
```

```
END SELECT
```

```
END DETAIL
```

```
INITIALISE
```

```
  Add
```

```
-----  
Time Units are in HOURS  
-----
```

```
-----  
IKE Basic  
  Supply (1) = 200  
IKM Basin  
  Supply (2) = 200  
  Wshift = WRetSh  
  Eshift = ERetSh  
  CskLdWS = Days5  
  CskLdES = Days5E  
  TxToCVDS = Days5  
  VDSHift = Days7  
  Tx1K2ES = Days5  
  CSBCaskS = Days5  
  TxCskBS = Days5  
  End Actions  
END INITIALISE
```

CASE 1. TWO 12 HR SHIFTS/DAY, 5 DAYS/WEEK

SNF Project operating 2 twelve hr shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week

B-20

SNF Project operating 2 twelve hr shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week

SNF Project operating 2 twelve hr shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week

1 WITNESS MODEL: SNF520HR

Base Model - 5 days/week 20 hrs/day

CLOCK

UNIT : Hours;
MULTIPLE : 1,Day,24,0;
MULTIPLE : 2,Week,7,0;
MULTIPLE : 3,,0,0;
RATIO : 1:1;
DISPLAY : USER;
END CLOCK

DETAIL

OPTIONS

BREAKDOWN MODEL: Mean;
PRN Stream : 1;
REPAIR MODEL: Actual;
LABOR TO UNLOAD : No;
WARMUP PERIOD : 0.00;
OUTPUT INTERVAL : None;
UNBLOCK BASIS : Priority;
MONITOR STEP : Undefined;
MIXTURE STEP : Undefined;
MODULE ELEMENT NAMES : Use local preferences;
END OPTIONS

SELECT

CskLoadW

NAME OF MACHINE: CskLoadW;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);
BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish

Add
CHANGE ALL to mco_cask
countmco (1) = countmco (1) + 1
IF countmco (1) = 200
DESC = "LstW"

Done (3) = TIME
ENDIF
End Actions
INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(1)#{1},
CaskBuf#{1};
OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLdWS,0,0;

END CskLoadW

Vacuum

NAME OF MACHINE: Vacuum;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (74,84,113,N + 6);
BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 40.0;
* Repair time: 40.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish

Add
Inote that its the first time through
PEN = 1

VacNops (1) = NOPS (Vacuum(1))
VacNops (2) = NOPS (Vacuum(2))
VacNops (3) = NOPS (Vacuum(3))
VacNops (4) = NOPS (Vacuum(4))
VacNops (5) = NOPS (Vacuum(5))
VacNops (6) = NOPS (Vacuum(6))
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (1) = LastMCO (1) + 1
Done (6) = TIME

ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: IF ISTATE (CSBCask) = 1
PUSH to TxIKToZE

ELSE
Wait
ENDIF;
REPORTING: Individual;
SHIFT: VDShift,0,0;

END Vacuum

MCO

NAME OF PART: MCO;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: END
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END MCO

FuelBasQ

NAME OF HISTOGRAM: FuelBasQ;
QUANTITY: 1;
STATS RESET : Yes;

END FuelBasQ

BasinBuf

NAME OF BUFFER: BasinBuf;
QUANTITY: 2;
CAPACITY: 2;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
Select: First;
ACTIONS, In
Add

IRECORD NPARTS (BasinBuf(2)) in FuelBasQ

Itotobs = INHUM (FuelBasQ)
Icellone = INCELL (FuelBasQ,1)
Ionepc = cellone / totobs

End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END BasinBuf

FuelRetW

NAME OF MACHINE: FuelRetW;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END

DISCRETE LINKS :
Fill: None

END

DISCRETE LINKS :
Empty: None

END

CYCLE TIME: TRIANGLE (36,37,50,N);
BREAKDOWN_DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 17.0;
* Scrap part: No;
* Description: Breakdown Number 1

* Setup on repair: No;
* Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Start

Add

Supply (1) = Supply (1) - 1

End Actions

ACTIONS, Finish

Add

IF Supply (1) = 0

Done (1) = TIME

ENDIF

End Actions

INPUT RULE: IF Supply (1) > 0

PULL from MCO out of WORLD

ELSE

Wait

ENDIF;

OUTPUT RULE: PUSH to BasinBuf(1);

REPORTING: Individual;

SHIFT: Wshift,0,0;

END FuelRetW

basbufpc

NAME OF VARIABLE: basbufpc;

QUANTITY: 1;

REPORTING: Yes;

END basbufpc

Tx1Kto2E

NAME OF MACHINE: Tx1Kto2E;

QUANTITY: 1;

TYPE: Single;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (0.5,1,4,13);

BREAKDOWN_DETAIL

Breakdown number: 1

* Mode: Available time;

* Down interval: 150.0;

* Repair time: 3.0;

* Scrap part: No;

* Description: Breakdown Number 1

* Setup on repair: No;

* Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Finish

Add

B-24

```

IF DESC = "LstW" OR DESC = "LstE"
  LastMCO (2) = LastMCO (2) + 1
  Done (7) = TIME
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to CSBCask;
REPORTING: Individual;
SHIFT: Tx1KZES,0,0;

END Tx1KtoZE

MHMTx

NAME OF MACHINE: MHMTx;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (3,3.25,4,15);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 150.0;
  * Repair time: 6.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
  IF PEN = 3
    Complete = Complete + 1
    IF NWIP (MCO) = 1 (all MCO's are complete)
      STOP
    ENDIF
  ENDIF
End Actions
INPUT RULE: IF ISTATE (HotCond(1)) = 0
  Wait
ELSE
  IF NPARTS (HotCond) > 5
    PULL from HotCond
  ELSE
    PULL from CSB
  ENDIF
ENDIF;
OUTPUT RULE: SELECT on PEN CSB,HotCond,SHIP;
REPORTING: Individual;
SHIFT: Days5,0,0;

END MHMTx

FuelRetE

```

```

NAME OF MACHINE: FuelRetE;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (36,37,50,M);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 35.0;
  * Repair time: 17.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Start
Add
  Supply (2) = Supply (2) - 1
End Actions
ACTIONS, Finish
Add
  IF Supply (2) = 0
    Done (2) = TIME
  ENDIF
End Actions
INPUT RULE: IF Supply (2) > 0
  PULL from MCO out of WORLD
ELSE
  Wait
ENDIF;
OUTPUT RULE: PUSH to BasinBuf(2);
REPORTING: Individual;
SHIFT: EShift,0,0;

END FuelRetE

CSBCask

NAME OF MACHINE: CSBCask;
QUANTITY: 1;
TYPE: Production;
* Part type: EmpCask;
* Production qty: 1;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END

```

CYCLE TIME: TRIANGLE (10.4,11.4,13.4,14);

BREAKDOWN_DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 300.0;
* Repair time: 6.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:

Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Finish

Add

CHANGE mco cask to MCO
IF DESC = "LstM" OR DESC = "LstE"
LastMCO (3) = LastMCO (3) + 1

ENDIF

End Actions

INPUT RULE: Wait;
OUTPUT RULE: PUSH EmpCask to TxToCsk8, MCO to MHMTx;
REPORTING: Individual;
SHIFT: CSBCask8,0,0;

END CSBCask

HotCond

NAME OF MACHINE: HotCond;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END

CYCLE TIME: HC CTime;

BREAKDOWN_DETAIL

Breakdown number: 1
* Mode: Busy time;
* Down interval: 40.0;
* Repair time: 60.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:

Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Start

Add

x = RANDOM (98)
IF x < 0.8
HC CTime = 140
ELSE
HC CTime = 205
ENDIF

End Actions

ACTIONS, Finish

Add

PEN = 3
HCNOps (1) = NOPS (HotCond(1))
HCNOps (2) = NOPS (HotCond(2))
HCNOps (3) = NOPS (HotCond(3))
HCNOps (4) = NOPS (HotCond(4))
HCNOps (5) = NOPS (HotCond(5))
HCNOps (6) = NOPS (HotCond(6))
IF DESC = "LstM" OR DESC = "LstE"
Done (8) = TIME
ENDIF

End Actions

INPUT RULE: Wait;
OUTPUT RULE: PUSH to MHMTx;
REPORTING: Individual;
SHIFT: DelayMC,0,0;

END HotCond

Days5E

NAME OF SHIFT: Days5E;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 2184.000000;
SHIFT DATA: SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5We;
REPORTING: Yes;

END Days5E

onepc

NAME OF VARIABLE: onepc;
QUANTITY: 1;
REPORTING: Yes;

END onepc

totobs

NAME OF VARIABLE: totobs;
QUANTITY: 1;
REPORTING: Yes;

END totobs

CSB

NAME OF BUFFER: CSB;
QUANTITY: 1;
CAPACITY: 1000;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;

ACTIONS, In

Add

Make it its second pass
PEN = 2

End Actions
 REPORTING: Individual;
 SHIFT: Undefined,0;
 END CSB
 cellone
 NAME OF VARIABLE: cellone;
 QUANTITY: 1;
 REPORTING: Yes;
 END cellone
 CskLoadE
 NAME OF MACHINE: CskLoadE;
 QUANTITY: 1;
 TYPE: Assembly;
 * Assembly quantity: 2;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (12,16,9,26,N + 4);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 35.0;
 * Repair time: 7.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 CHANGE ALL to mco_cask
 countmco (2) = countmco (2) + 1
 IF countmco (2) = 200
 Done (4) = TIME
 DESC = "LstE"
 ENDIF
 End Actions
 INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(2)#{1),
 CaskBuf#{1);
 OUTPUT RULE: PUSH to TxToCVD;
 REPORTING: Individual;
 SHIFT: CskLdES,0,0;
 END CskLoadE
 Days5
 NAME OF SHIFT: Days5;
 TYPE OF SHIFT: main;
 OFFSET:

Working time: 0.000000;
 Rest time: 0.000000;
 ACTIONS, End
 Add
 IF Done (3) > 1 AND ISTATE (CskLoadW) <> 3
 CskLdWS = Woff
 ENDIF
 IF Done (4) > 1 AND ISTATE (CskLoadE) <> 3
 CskLdES = Eoff
 ENDIF
 IF countmco (1) = 200 AND countmco (2) = 200
 TxToCVDs = Eoff
 ENDIF
 IF LastMCO (1) = 2 AND ISTATE (Vacuum(1)) <> 3
 VDShift = Eoff
 ENDIF
 IF LastMCO (2) = 2 AND ISTATE (Tx1KTo2E) <> 3
 Tx1K2ES = Eoff
 ENDIF
 IF LastMCO (3) = 2 AND ISTATE (CSBCask) <> 3
 CSBCasks = Eoff
 ENDIF
 IF LastMCO (4) = 2 AND ISTATE (TxToCskB) <> 3
 TxCskBS = Eoff
 ENDIF
 End Actions
 SHIFT DATA: SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5We;
 REPORTING: Yes;
 END Days5
 Complete
 NAME OF VARIABLE: Complete;
 QUANTITY: 1;
 REPORTING: Yes;
 END Complete
 Supply
 NAME OF VARIABLE: Supply;
 QUANTITY: 2;
 REPORTING: Yes;
 END Supply
 TxToCVD
 NAME OF MACHINE: TxToCVD;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None

END
 CYCLE TIME: TRIANGLE (0.1,0.25,0.5,13);
 BREAKDOWN_DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 0.5;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN_DETAIL
 ACTIONS, Finish
 Add
 IF countmco (1) = 200 AND countmco (2) = 200
 Done (5) = TIME
 ENDIF
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to Vacuum;
 REPORTING: Individual;
 SHIFT: TxToCvds,0,0;
 END TxToCvD
 DelayHC
 NAME OF SHIFT: DelayHC;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 6552.000000;
 SHIFT DATA: 168.000000,0.000000,0.000000;
 REPORTING: Yes;
 END DelayHC
 Done
 NAME OF VARIABLE: Done;
 QUANTITY: 8;
 REPORTING: Yes;
 END Done
 VDryUse
 NAME OF HISTOGRAM: VDryUse;
 QUANTITY: 1;
 STATS RESET : Yes;
 END VDryUse
 CaskBuf
 NAME OF BUFFER: CaskBuf;
 QUANTITY: 1;
 CAPACITY: 100;
 DELAY MODE : None;
 INPUT POSITION: Rear;
 OUTPUT SCAN FROM: Front;
 * Select: First;
 ACTIONS, In

Add
 IRECORD NPARTS (CaskBuf) in CaskBufQ
 Itotobs = INUM (CaskBufQ)
 Icellone = ICELL (CaskBufQ,1)
 Ionepc = cellone / totobs
 End Actions
 ACTIONS, Out
 Add
 RECORD 9 - NPARTS (CaskBuf) in CaskBufQ
 End Actions
 REPORTING: Individual;
 SHIFT: Undefined,0;
 END CaskBuf
 EmpCask
 NAME OF PART: EmpCask;
 TYPE: Variable attributes;
 GROUP NUMBER: 1;
 MAXIMUM ARRIVALS: 9;
 INTER ARRIVAL TIME: Undefined;
 FIRST ARRIVAL AT: 0.0;
 LOT SIZE: 9;
 OUTPUT RULE: PUSH to CaskBuf;
 PART ROUTE: None
 REPORTING: Yes;
 CONTAINS FLUIDS: No;
 SHIFT: Undefined;
 END EmpCask
 mco_cask
 NAME OF PART: mco_cask;
 TYPE: Variable attributes;
 GROUP NUMBER: 1;
 MAXIMUM ARRIVALS: 0;
 OUTPUT RULE: Wait;
 PART ROUTE: None
 REPORTING: Yes;
 CONTAINS FLUIDS: No;
 SHIFT: Undefined;
 END mco_cask
 TxToCskB
 NAME OF MACHINE: TxToCskB;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (0.5,1,4,13);
 BREAKDOWN_DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;

```

* Repair time: 3.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add
  LastMCO (4) = LastMCO (3)
End Actions
  INPUT RULE: Wait;
  OUTPUT RULE: PUSH to CaskBuf;
  REPORTING: Individual;
  SHIFT: TxToCskB,0,0;
END TxToCskB

CaskTot
NAME OF VARIABLE: CaskTot;
QUANTITY: 1;
REPORTING: Yes;

END CaskTot

No_CaskW
NAME OF VARIABLE: No_CaskW;
QUANTITY: 1;
REPORTING: Yes;

END No_CaskW

No_CaskE
NAME OF VARIABLE: No_CaskE;
QUANTITY: 1;
REPORTING: Yes;

END No_CaskE

HC_CTime
NAME OF VARIABLE: HC_CTime;
QUANTITY: 1;
REPORTING: Yes;

END HC_CTime

x
NAME OF VARIABLE: x;
QUANTITY: 1;
REPORTING: Yes;

END x

CaskBufQ
NAME OF HISTOGRAM: CaskBufQ;
QUANTITY: 1;
STATS RESET : Yes;

```

```

END CaskBufQ

FRWest
NAME OF LABOR: FRWest;
QUANTITY no shift: 1;
REPORTING: Yes;

END FRWest

countmco
NAME OF VARIABLE: countmco;
QUANTITY: 4;
REPORTING: Yes;

END countmco

VacNOps
NAME OF VARIABLE: VacNOps;
QUANTITY: 6;
REPORTING: Yes;

END VacNOps

SD5_1day
NAME OF SHIFT: SD5_1day;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 20.000000,4.000000,0.000000;
REPORTING: Yes;

END SD5_1day

SD5We
NAME OF SHIFT: SD5We;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 0.000000,48.000000,0.000000;
REPORTING: Yes;

END SD5We

HCNOps
NAME OF VARIABLE: HCNOps;
QUANTITY: 6;
REPORTING: Yes;

END HCNOps

WRU1_Day
NAME OF SHIFT: WRU1_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 2.000000,22.000000,0.000000;

```


REPORTING: Yes;

END WRU1_Day

WRU2_Day

NAME OF SHIFT: WRU2_Day;
TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: 5.000000,19.000000,0.000000;

REPORTING: Yes;

END WRU2_Day

WRU3_Day

NAME OF SHIFT: WRU3_Day;
TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: 8.000000,16.000000,0.000000;

REPORTING: Yes;

END WRU3_Day

WRU4_Day

NAME OF SHIFT: WRU4_Day;
TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: 11.000000,13.000000,0.000000;

REPORTING: Yes;

END WRU4_Day

WRU5_Day

NAME OF SHIFT: WRU5_Day;
TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: 14.000000,10.000000,0.000000;

REPORTING: Yes;

END WRU5_Day

WRU6_Day

NAME OF SHIFT: WRU6_Day;
TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: 17.000000,7.000000,0.000000;

REPORTING: Yes;

END WRU6_Day

WRU7_Day

NAME OF SHIFT: WRU7_Day;
TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: 20.000000,4.000000,0.000000;

REPORTING: Yes;

END WRU7_Day

ERU4_Day

NAME OF SHIFT: ERU4_Day;
TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: 3.000000,21.000000,0.000000;

REPORTING: Yes;

END ERU4_Day

ERU5_Day

NAME OF SHIFT: ERU5_Day;
TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: 9.000000,15.000000,0.000000;

REPORTING: Yes;

END ERU5_Day

ERU6_Day

NAME OF SHIFT: ERU6_Day;
TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: 15.000000,9.000000,0.000000;

REPORTING: Yes;

END ERU6_Day

ERU7_Day

NAME OF SHIFT: ERU7_Day;
TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: 20.000000,4.000000,0.000000;

REPORTING: Yes;

END ERU7_Day

ERU4_Mon

NAME OF SHIFT: ERU4_Mon;
TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: ERU4_Day

WRU1_Day
 SD5We
 WRU1_Day
 WRU1_Day
 WRU1_Day
 WRU1_Day
 WRU1_Day
 SD5We
 WRU1_Day
 WRU1_Day
 WRU1_Day
 WRU1_Day
 WRU1_Day
 SD5We
 WRU1_Day
 WRU1_Day
 WRU1_Day
 WRU1_Day
 WRU1_Day
 SD5We
 WRU1_Day
 WRU1_Day;
 REPORTING: Yes;

END WRU1_Mon

WRU2_Mon

NAME OF SHIFT: WRU2_Mon;
 TYPE OF SHIFT: sub shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: WRU2_Day

WRU2_Day
 WRU2_Day
 WRU2_Day
 WRU2_Day
 SD5We
 WRU2_Day
 WRU2_Day
 WRU2_Day
 WRU2_Day
 WRU2_Day
 SD5We
 WRU2_Day
 WRU2_Day
 WRU2_Day
 WRU2_Day
 SD5We
 WRU2_Day
 WRU2_Day
 WRU2_Day
 WRU2_Day
 SD5We
 WRU2_Day
 WRU2_Day
 WRU2_Day
 WRU2_Day
 SD5We
 WRU2_Day
 WRU2_Day;
 REPORTING: Yes;

END WRU2_Mon

WRU3_Mon

NAME OF SHIFT: WRU3_Mon;

TYPE OF SHIFT: sub shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: WRU3_Day

WRU3_Day
 WRU3_Day
 WRU3_Day
 WRU3_Day
 SD5We
 WRU3_Day
 WRU3_Day
 WRU3_Day
 WRU3_Day
 WRU3_Day
 SD5We
 WRU3_Day
 WRU3_Day
 WRU3_Day
 WRU3_Day
 SD5We
 WRU3_Day
 WRU3_Day
 WRU3_Day
 WRU3_Day
 SD5We
 WRU3_Day
 WRU3_Day;
 REPORTING: Yes;

END WRU3_Mon

WRU4_Mon

NAME OF SHIFT: WRU4_Mon;
 TYPE OF SHIFT: sub shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: WRU4_Day

WRU4_Day
 WRU4_Day
 WRU4_Day
 WRU4_Day
 SD5We
 WRU4_Day
 WRU4_Day
 WRU4_Day
 WRU4_Day
 WRU4_Day
 SD5We
 WRU4_Day
 WRU4_Day
 WRU4_Day
 WRU4_Day
 SD5We
 WRU4_Day
 WRU4_Day
 WRU4_Day
 WRU4_Day
 SD5We
 WRU4_Day
 WRU4_Day
 WRU4_Day
 WRU4_Day
 SD5We
 WRU4_Day
 WRU4_Day;
 REPORTING: Yes;

MHC-SD-SNF-RPT-011
 Rev. 0

WRU4 Day;
WRU4 Day;
REPORTING: Yes;

END WRU4_Mon

WRU5_Mon

NAME OF SHIFT: WRU5 Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU5_Day

WRU5 Day
WRU5 Day
WRU5 Day
WRU5 Day
SD5We
WRU5 Day
WRU5 Day
WRU5 Day
WRU5 Day
WRU5 Day
SD5We
WRU5 Day
WRU5 Day
WRU5 Day
WRU5 Day
WRU5 Day
SD5We
WRU5 Day
WRU5 Day;
REPORTING: Yes;

END WRU5_Mon

WRU6_Mon

NAME OF SHIFT: WRU6 Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU6_Day

WRU6 Day
WRU6 Day
WRU6 Day
WRU6 Day
SD5We
WRU6 Day
WRU6 Day
WRU6 Day
WRU6 Day
SD5We
WRU6 Day
WRU6 Day
WRU6 Day
WRU6 Day

WRU6 Day
SD5We
WRU6 Day
WRU6 Day
WRU6 Day
WRU6 Day
SD5We
WRU6 Day
WRU6 Day
WRU6 Day;
REPORTING: Yes;

END WRU6_Mon

WRU7_Mon

NAME OF SHIFT: WRU7 Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU7_Day

WRU7 Day
WRU7 Day
WRU7 Day
SD5We;
REPORTING: Yes;

END WRU7_Mon

WRetSh

NAME OF SHIFT: WRetSh;
TYPE OF SHIFT: main;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
ACTIONS, End

Add

IF TIME > 4368
Wshift = WShRep
IF Done (1) > 1
Wshift = Woff
ENDIF

ENDIF

End Actions

SHIFT DATA: WRU1_Mon

WRU2_Mon
WRU3_Mon
WRU4_Mon
WRU5_Mon
WRU6 Mon;
REPORTING: Yes;

END WRetSh

ERetSh

NAME OF SHIFT: ERetSh;
TYPE OF SHIFT: main;
OFFSET:

Working time: 0.000000;
Rest time: 2184.000000;
ACTIONS, End

```

Add
  IF TIME > 4368
    EShift = EshRep
    IF Done (2) > 1
      EShift = Eoff
    ENDIF
  ENDIF
End Actions
SHIFT DATA: ERU4_Mon
ERU5_Mon
ERU6_Mon;
REPORTING: Yes;

END ERetSh

Wshift
NAME OF VARIABLE: Wshift;
QUANTITY: 1;
REPORTING: Yes;

END Wshift

WShRep
NAME OF SHIFT: WShRep;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: WRU7_Mon;
REPORTING: Yes;

END WShRep

EshRep
NAME OF SHIFT: EshRep;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: ERU7_Mon;
REPORTING: Yes;

END EshRep

EShift
NAME OF VARIABLE: EShift;
QUANTITY: 1;
REPORTING: Yes;

END EShift

Eoff
NAME OF SHIFT: Eoff;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 0.000000,168.000000,0.000000;
REPORTING: Yes;

END Eoff

```

```

Woff
NAME OF SHIFT: Woff;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 0.000000,168.000000,0.000000;
REPORTING: Yes;

END Woff

Days7
NAME OF SHIFT: Days7;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 168.000000,0.000000,0.000000;
REPORTING: Yes;

END Days7

VShift
NAME OF VARIABLE: VShift;
QUANTITY: 1;
REPORTING: Yes;

END VShift

CskLdWS
NAME OF VARIABLE: CskLdWS;
QUANTITY: 1;
REPORTING: Yes;

END CskLdWS

CskLdES
NAME OF VARIABLE: CskLdES;
QUANTITY: 1;
REPORTING: Yes;

END CskLdES

TxToCVDS
NAME OF VARIABLE: TxToCVDS;
QUANTITY: 1;
REPORTING: Yes;

END TxToCVDS

Tx1K2ES
NAME OF VARIABLE: Tx1K2ES;
QUANTITY: 1;
REPORTING: Yes;

END Tx1K2ES

CSBCaskS

```

NAME OF VARIABLE: CSBCaskS;
QUANTITY: 1;
REPORTING: Yes;

END CSBCaskS

TxCskBS

NAME OF VARIABLE: TxCskBS;
QUANTITY: 1;
REPORTING: Yes;

END TxCskBS

LastMCO

NAME OF VARIABLE: LastMCO;
QUANTITY: 4;
REPORTING: Yes;

END LastMCO

END SELECT

END DETAIL

INITIALISE

Add

Time Units are in HOURS

IKK Basic

Supply (1) = 200

IKW Basin

Supply (2) = 200

Wshift = WRetSh

EShift = ERetSh

CskLdMS = Days5

CskLdES = Days5E

TxToCVDS = Days5

VDshift = Days7

TxIK2ES = Days5

CSBCaskS = Days5

TxCskBS = Days5

End Actions

END INITIALISE

B-35

**CASE 2. THREE 8HR SHIFTS/DAY, 5 DAYS/WEEK.
FUEL RETRIEVAL OPERATING AT 90% EFFICIENCY**

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week. With an 90% TOE on fuel retrieval

B-37

WHC-SD-SNF-RPT-011
Rev. 0

6/29/96

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week. With an 90% TOE on fuel retrieval

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week. With an 90% TOE on fuel retrieval

B-39

WHC-SD-SNF-RPT-011
Rev. 0

! WITNESS MODEL: B5T0E90

Base Model - 5 days/wk, 18 hrs/day
90 % Efficiency

CLOCK

UNIT : Hours;
MULTIPLE : 1,Day,24,0;
MULTIPLE : 2,Week,7,0;
MULTIPLE : 3,,0,0;
RATIO : 1:1;
DISPLAY : USER;
END CLOCK

DETAIL

OPTIONS

BREAKDOWN MODEL: Mean;
PRW Stream : 1;
REPAIR MODEL: Actual;
LABOR TO UNLOAD : No;
WARMUP PERIOD : 0.00;
OUTPUT INTERVAL : None;
UNBLOCK BASIS : Priority;
MONITOR STEP : Undefined;
MIXTURE STEP : Undefined;
MODULE ELEMENT NAMES : Use local preferences;
END OPTIONS

SELECT

CskLoadW

NAME OF MACHINE: CskLoadW;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END

DISCRETE LINKS :
Fill: None

END

DISCRETE LINKS :
Empty: None

END

CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);

BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

CHANGE ALL to mco_cask
countmco (1) = countmco (1) + 1
IF countmco (1) = 200

DESC = "LstW"

Done (3) = TIME

ENDIF

End Actions

INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(1)#{1),
CaskBuf#(1);
OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLdW,0,0;

END CskLoadW

Vacuum

NAME OF MACHINE: Vacuum;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END

DISCRETE LINKS :
Fill: None

END

DISCRETE LINKS :
Empty: None

END

CYCLE TIME: TRIANGLE (74,84,113,N + 6);

BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 40.0;
* Repair time: 40.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

Inote that its the first time through

PEN = 1

VacNops (1) = NOPS (Vacuum(1))
VacNops (2) = NOPS (Vacuum(2))
VacNops (3) = NOPS (Vacuum(3))
VacNops (4) = NOPS (Vacuum(4))
VacNops (5) = NOPS (Vacuum(5))
VacNops (6) = NOPS (Vacuum(6))
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (1) = LastMCO (1) + 1
Done (6) = TIME

ENDIF

End Actions

INPUT RULE: Wait;
OUTPUT RULE: IF ISTATE (CSBCask) = 1
PUSH to Tx1KTo2E
ELSE
Wait
ENDIF;

REPORTING: Individual;
SHIFT: VDSHift,0,0;

END Vacuum

B-40

WHC-SD-SNF-RPT-011
Rev. 0

```

MCO
NAME OF PART: MCO;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MCM ARRIVALS: 0;
PART NAME: MCO;
OUTPUT RULE: END;
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;
END MCO

FuelBaso
NAME OF HISTOGRAM: FuelBaso;
QUANTITY: 1;
STATS RESET: Yes;
END FuelBaso

BasinBuf
NAME OF BUFFER: BasinBuf;
QUANTITY: 2;
CAPACITY: 2;
DELAY MODE: None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
ACTIONS, Out
RECORD NPARTS (BasinBuf(2)) in FuelBaso
itotoba = INUM (FuelBaso)
lonepc = cellone / totoba
END Actions
REPORTING: Individual;
SHIFT: Undefined,0;
END BasinBuf

FuelRetu
NAME OF MACHINE: FuelRetu;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Empty: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: TRIANGLE (0.5,1,4,13);
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 150.0;
* Repair time: 3.0;
* Scrap part: No;
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
ACTIONS, Finish

* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
BREAKDOWN DETAIL
ACTIONS, Start
Add
Supply (1) = supply (1) - 1
End Actions
ACTIONS, Finish
Add
IF Supply (1) = 0
Done (1) = TIME
ENDIF
ENDIF
INPUT RULE: IF Supply (1) > 0
EXCL. from MCO out of WORLD
ELSE
Wait
ENDIF;
OUTPUT RULE: PUSH to BasinBuf(1);
REPORTING: Individual;
SHIFT: Wshift,0,0;
END FuelRetu

basbufpc
NAME OF VARIABLE: basbufpc;
QUANTITY: 1;
TYPE: Single;
REPORTING: Yes;
END basbufpc

TxikToZe
NAME OF MACHINE: TxikToZe;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Empty: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: TRIANGLE (0.5,1,4,13);
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 150.0;
* Repair time: 3.0;
* Scrap part: No;
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
ACTIONS, Finish

```

Add
 IF DESC = "LstW" OR DESC = "LstE"
 LastMCO (2) = LastMCO (2) + 1
 Done (7) = TIME
 ENDIF
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to CSBCask;
 REPORTING: Individual;
 SHIFT: Tx1K2ES,0,0;

 END Tx1KToZE

 MHMTx

 NAME OF MACHINE: MHMTx;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (3,3.25,4,15);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 6.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 IF PEN = 3
 Complete = Complete + 1
 IF NWIP (MCO) = 1 All MCO's are complete
 STOP
 ENDIF
 End Actions
 INPUT RULE: IF ISTATE (HotCond(1)) = 0
 Wait
 ELSE
 IF NPARTS (HotCond) > 5
 PULL from HotCond
 ELSE
 PULL from CSB
 ENDIF
 ENDIF;
 OUTPUT RULE: SELECT on PEN CSB,HotCond,SHIP;
 REPORTING: Individual;
 SHIFT: Days5,0,0;

 END MHMTx

FuelRetE

 NAME OF MACHINE: FuelRetE;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (36,37,50,N);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 35.0;
 * Repair time: 5.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Start
 Add
 Supply (2) = Supply (2) - 1
 End Actions
 ACTIONS, Finish
 Add
 IF Supply (2) = 0
 Done (2) = TIME
 ENDIF
 End Actions
 INPUT RULE: IF Supply (2) > 0
 PULL from MCO out of WORLD
 ELSE
 Wait
 ENDIF;
 OUTPUT RULE: PUSH to BasinBuf(2);
 REPORTING: Individual;
 SHIFT: EShift,0,0;

 END FuelRetE

 CSBCask

 NAME OF MACHINE: CSBCask;
 QUANTITY: 1;
 TYPE: Production;
 * Part type: EmpCask;
 * Production qty: 1;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None

END
CYCLE TIME: TRIANGLE (10.4,11.4,13.4,14);
BREAKDOWN_DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 300.0;
* Repair time: 6.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
CHANGE mco cask to MCO
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (3) = LastMCO (3) + 1
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH EmpCask to TxToCskB, MCO to MHMTx;
REPORTING: Individual;
SHIFT: CSBCaskS,0,0;
END CSBCask
HotCond
NAME OF MACHINE: HotCond;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: HC CTime;
BREAKDOWN_DETAIL
Breakdown number: 1
* Mode: Busy time;
* Down interval: 40.0;
* Repair time: 60.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Start
Add
x = RANDOM (98)
IF x < 0.8
HC CTime = 140
ELSE
HC CTime = 205
ENDIF

End Actions
ACTIONS, Finish
Add
PEN = 3
HCNOps (1) = NOPS (HotCond(1))
HCNOps (2) = NOPS (HotCond(2))
HCNOps (3) = NOPS (HotCond(3))
HCNOps (4) = NOPS (HotCond(4))
HCNOps (5) = NOPS (HotCond(5))
HCNOps (6) = NOPS (HotCond(6))
IF DESC = "LstW" OR DESC = "LstE"
Done (8) = TIME
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to MHMTx;
REPORTING: Individual;
SHIFT: DelayHC,0,0;
END HotCond
Days5E
NAME OF SHIFT: Days5E;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 2184.000000;
SHIFT DATA: SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5Me;
REPORTING: Yes;
END Days5E
onepc
NAME OF VARIABLE: onepc;
QUANTITY: 1;
REPORTING: Yes;
END onepc
totobs
NAME OF VARIABLE: totobs;
QUANTITY: 1;
REPORTING: Yes;
END totobs
CSB
NAME OF BUFFER: CSB;
QUANTITY: 1;
CAPACITY: 1000;
DELAY MODE: None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add
I make it its second pass

PEN = 2
 End Actions
 REPORTING: Individual;
 SHIFT: Undefined,0;
 END CSB
 cellone
 NAME OF VARIABLE: cellone;
 QUANTITY: 1;
 REPORTING: Yes;
 END cellone
 CskLoadE
 NAME OF MACHINE: CskLoadE;
 QUANTITY: 1;
 TYPE: Assembly;
 * Assembly quantity: 2;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (12,16,9,26,N + 4);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 35.0;
 * Repair time: 7.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 CHANGE ALL to mco.cask
 countmco (2) = countmco (2) + 1
 IF countmco (2) = 200
 Done (4) = TIME
 DESC = "LSTE"
 ENDIF
 End Actions
 INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(2)#(1),
 CaskBuf#(1);
 OUTPUT RULE: PUSH to TxToCVD;
 REPORTING: Individual;
 SHIFT: CskLoadE,0,0;
 END CskLoadE
 Days5
 NAME OF SHIFT: Days5;
 TYPE OF SHIFT: main;

OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 ACTIONS, End
 Add
 IF Done (3) > 1 AND ISTATE (CskLoadW) <> 3
 CskLoadW = Woff
 ENDIF
 IF Done (4) > 1 AND ISTATE (CskLoadE) <> 3
 CskLoadE = Eoff
 ENDIF
 IF countmco (1) = 200 AND countmco (2) = 200
 TxToCVD = Eoff
 ENDIF
 IF LastMCO (1) = 2 AND ISTATE (Vacuum(1)) <> 3
 VDSHift = Eoff
 ENDIF
 IF LastMCO (2) = 2 AND ISTATE (Tx1Kto2E) <> 3
 Tx1K2ES = Eoff
 ENDIF
 IF LastMCO (3) = 2 AND ISTATE (CSBCask) <> 3
 CSBCaskS = Eoff
 ENDIF
 IF LastMCO (4) = 2 AND ISTATE (TxToCskB) <> 3
 TxCskBS = Eoff
 ENDIF
 End Actions
 SHIFT DATA: SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 REPORTING: Yes;
 END Days5
 Complete
 NAME OF VARIABLE: Complete;
 QUANTITY: 1;
 REPORTING: Yes;
 END Complete
 Supply
 NAME OF VARIABLE: Supply;
 QUANTITY: 2;
 REPORTING: Yes;
 END Supply
 TxToCVD
 NAME OF MACHINE: TxToCVD;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (0.1,0.25,0.5,13);

BREAKDOWN DETAIL

Breakdown number: 1

- * Mode: Available time;
- * Down interval: 150.0;
- * Repair time: 0.5;
- * Scrap part: No;
- * Description: Breakdown Number 1
- * Setup on repair: No;
- * Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

IF countmco (1) = 200 AND countmco (2) = 200

Done (5) = TIME

ENDIF

End Actions

INPUT RULE: Wait;

OUTPUT RULE: PUSH to Vacuum;

REPORTING: Individual;

SHIFT: TxToCvds,0,0;

END TxToCvD

DelayHC

NAME OF SHIFT: DelayHC;

TYPE OF SHIFT: main;

OFFSET:

Working time: 0.000000;

Rest time: 6552.000000;

SHIFT DATA: 168.000000,0.000000,0.000000;

REPORTING: Yes;

END DelayHC

Done

NAME OF VARIABLE: Done;

QUANTITY: 8;

REPORTING: Yes;

END Done

VdryUse

NAME OF HISTOGRAM: VdryUse;

QUANTITY: 1;

STATS RESET: Yes;

END VdryUse

CaskBuf

NAME OF BUFFER: CaskBuf;

QUANTITY: 1;

CAPACITY: 100;

DELAY MODE: None;

INPUT POSITION: Rear;

OUTPUT SCAN FROM: Front;

- * Select: First;

ACTIONS, In

Add

!RECORD NPARTS (CaskBuf) in CaskBufQ

!totobs = !HNUM (CaskBufQ)

!cellone = !NCELL (CaskBufQ,1)

!onepc = cellone / totobs

End Actions

ACTIONS, Out

Add

RECORD 9 - NPARTS (CaskBuf) in CaskBufQ

End Actions

REPORTING: Individual;

SHIFT: Undefined,0;

END CaskBuf

EmpCask

NAME OF PART: EmpCask;

TYPE: Variable attributes;

GROUP NUMBER: 1;

MAXIMUM ARRIVALS: 9;

INTER ARRIVAL TIME: Undefined;

FIRST ARRIVAL AT: 0.0;

LOT SIZE: 9;

OUTPUT RULE: PUSH to CaskBuf;

PART ROUTE: None

REPORTING: Yes;

CONTAINS FLUIDS: No;

SHIFT: Undefined;

END EmpCask

mco_cask

NAME OF PART: mco_cask;

TYPE: Variable attributes;

GROUP NUMBER: 1;

MAXIMUM ARRIVALS: 0;

OUTPUT RULE: Wait;

PART ROUTE: None

REPORTING: Yes;

CONTAINS FLUIDS: No;

SHIFT: Undefined;

END mco_cask

TxToCskB

NAME OF MACHINE: TxToCskB;

QUANTITY: 1;

TYPE: Single;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (0.5,1,4,13);

BREAKDOWN DETAIL

Breakdown number: 1

- * Mode: Available time;

* Down interval: 150.0;
 * Repair time: 3.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

LastMCO (4) = LastMCO (3)

End Actions

INPUT RULE: Wait;

OUTPUT RULE: PUSH to CaskBuf;

REPORTING: Individual;

SHIFT: TxCskBS,0,0;

END TxToCskB

CaskTot

NAME OF VARIABLE: CaskTot;

QUANTITY: 1;

REPORTING: Yes;

END CaskTot

No_CaskW

NAME OF VARIABLE: No_CaskW;

QUANTITY: 1;

REPORTING: Yes;

END No_CaskW

No_CasKE

NAME OF VARIABLE: No_CasKE;

QUANTITY: 1;

REPORTING: Yes;

END No_CasKE

HC_CTime

NAME OF VARIABLE: HC_CTime;

QUANTITY: 1;

REPORTING: Yes;

END HC_CTime

x

NAME OF VARIABLE: x;

QUANTITY: 1;

REPORTING: Yes;

END x

CaskBufQ

NAME OF HISTOGRAM: CaskBufQ;

QUANTITY: 1;

STATS RESET: Yes;

END CaskBufQ

FRWest

NAME OF LABOR: FRWest;

QUANTITY no shift: 1;

REPORTING: Yes;

END FRWest

countmco

NAME OF VARIABLE: countmco;

QUANTITY: 4;

REPORTING: Yes;

END countmco

VacNops

NAME OF VARIABLE: VacNops;

QUANTITY: 6;

REPORTING: Yes;

END VacNops

SD5_1day

NAME OF SHIFT: SD5_1day;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: 18.000000,6.000000,0.000000;

REPORTING: Yes;

END SD5_1day

SD5We

NAME OF SHIFT: SD5We;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: 0.000000,48.000000,0.000000;

REPORTING: Yes;

END SD5We

HCNops

NAME OF VARIABLE: HCNops;

QUANTITY: 6;

REPORTING: Yes;

END HCNops

WRU1_Day

NAME OF SHIFT: WRU1_Day;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

B-46

SHIFT DATA: 2.000000,22.000000,0.000000;
REPORTING: Yes;

END WRU1_Day

WRU2_Day

NAME OF SHIFT: WRU2_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 5.000000,19.000000,0.000000;
REPORTING: Yes;

END WRU2_Day

WRU3_Day

NAME OF SHIFT: WRU3_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 8.000000,16.000000,0.000000;
REPORTING: Yes;

END WRU3_Day

WRU4_Day

NAME OF SHIFT: WRU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 11.000000,13.000000,0.000000;
REPORTING: Yes;

END WRU4_Day

WRU5_Day

NAME OF SHIFT: WRU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 14.000000,10.000000,0.000000;
REPORTING: Yes;

END WRU5_Day

WRU6_Day

NAME OF SHIFT: WRU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 17.000000,7.000000,0.000000;
REPORTING: Yes;

END WRU6_Day

WRU7_Day

NAME OF SHIFT: WRU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END WRU7_Day

ERU4_Day

NAME OF SHIFT: ERU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 3.000000,21.000000,0.000000;
REPORTING: Yes;

END ERU4_Day

ERU5_Day

NAME OF SHIFT: ERU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 9.000000,15.000000,0.000000;
REPORTING: Yes;

END ERU5_Day

ERU6_Day

NAME OF SHIFT: ERU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 15.000000,9.000000,0.000000;
REPORTING: Yes;

END ERU6_Day

ERU7_Day

NAME OF SHIFT: ERU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END ERU7_Day

ERU4_Mon

NAME OF SHIFT: ERU4_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: ERU4_Day

ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
SD5We

ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
SD5We

ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
SD5We

ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
SD5We

ERU4_Day
ERU4_Day;

REPORTING: Yes;

END ERU4_Mon

ERU5_Mon

NAME OF SHIFT: ERU5_Mon;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: ERU5_Day

ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
SD5We

ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
SD5We

ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
SD5We

ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
SD5We

ERU5_Day
ERU5_Day;
REPORTING: Yes;

END ERU5_Mon

ERU6_Mon

NAME OF SHIFT: ERU6_Mon;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: ERU6_Day

ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
SD5We

ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
SD5We

ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
SD5We

ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
SD5We

ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day;
REPORTING: Yes;

END ERU6_Mon

ERU7_Mon

NAME OF SHIFT: ERU7_Mon;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: ERU7_Day

ERU7_Day
ERU7_Day
ERU7_Day
ERU7_Day
SD5We;

REPORTING: Yes;

END ERU7_Mon

WRU1_Mon

NAME OF SHIFT: WRU1_Mon;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU1_Day

WRU1_Day
WRU1_Day


```

SD5We
WRU4_Day
WRU4_Day;
REPORTING: Yes;

END WRU4_Mon

WRU5_Mon

NAME OF SHIFT: WRU5_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SD5We
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SD5We
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SD5We
WRU5_Day
WRU5_Day;
REPORTING: Yes;

END WRU5_Mon

WRU6_Mon

NAME OF SHIFT: WRU6_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SD5We
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SD5We
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day

```

```

WRU6 Day
WRU6 Day
SD5We
WRU6 Day
WRU6 Day
WRU6 Day
WRU6 Day
WRU6 Day
SD5We
WRU6 Day
WRU6 Day
WRU6 Day;
REPORTING: Yes;

END WRU6_Mon

WRU7_Mon

NAME OF SHIFT: WRU7 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
    Working time: 0.000000;
    Rest time: 0.000000;
SHIFT DATA: WRU7_Day
    WRU7_Day
    WRU7_Day
    WRU7_Day
    SD5We;
REPORTING: Yes;

END WRU7_Mon

WRetSh

NAME OF SHIFT: WRetSh;
TYPE OF SHIFT: main;
OFFSET:
    Working time: 0.000000;
    Rest time: 0.000000;
ACTIONS, End
Add
    IF Time > 4368
        Wshift = WshRep
        IF Done (1) > 1
            Wshift = Woff
        ENDIF
    ENDIF
End Actions
SHIFT DATA: WRU1_Mon
    WRU1_Mon
    WRU5_Mon
    WRU4_Mon
    WRU5_Mon
    WRU6_Mon;
REPORTING: Yes;

END WRetSh

ERetSh

NAME OF SHIFT: ERetSh;
TYPE OF SHIFT: main;
OFFSET:
    Working time: 0.000000;
    Rest time: 2184.000000;

```

ACTIONS, End
 Add
 IF TIME > 4368
 EShift = EShRep
 IF Done (2) > 1
 EShift = Eoff
 ENDIF
 ENDIF
 End Actions
 SHIFT DATA: ERU4_Mon
 ERU5_Mon
 ERU6_Mon;
 REPORTING: Yes;
 END ERetSh
 Wshift
 NAME OF VARIABLE: Wshift;
 QUANTITY: 1;
 REPORTING: Yes;
 END Wshift
 WShRep
 NAME OF SHIFT: WShRep;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: WRU7_Mon;
 REPORTING: Yes;
 END WShRep
 EShRep
 NAME OF SHIFT: EShRep;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: ERU7_Mon;
 REPORTING: Yes;
 END EShRep
 EShift
 NAME OF VARIABLE: EShift;
 QUANTITY: 1;
 REPORTING: Yes;
 END EShift
 Eoff
 NAME OF SHIFT: Eoff;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 0.000000, 168.000000, 0.000000;
 REPORTING: Yes;

END Eoff
 Woff
 NAME OF SHIFT: Woff;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 0.000000, 168.000000, 0.000000;
 REPORTING: Yes;
 END Woff
 Days7
 NAME OF SHIFT: Days7;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 168.000000, 0.000000, 0.000000;
 REPORTING: Yes;
 END Days7
 VDShift
 NAME OF VARIABLE: VDShift;
 QUANTITY: 1;
 REPORTING: Yes;
 END VDShift
 CskLdMS
 NAME OF VARIABLE: CskLdMS;
 QUANTITY: 1;
 REPORTING: Yes;
 END CskLdMS
 CskLdES
 NAME OF VARIABLE: CskLdES;
 QUANTITY: 1;
 REPORTING: Yes;
 END CskLdES
 TxToCvDS
 NAME OF VARIABLE: TxToCvDS;
 QUANTITY: 1;
 REPORTING: Yes;
 END TxToCvDS
 Tx1K2ES
 NAME OF VARIABLE: Tx1K2ES;
 QUANTITY: 1;
 REPORTING: Yes;
 END Tx1K2ES

B-51

```

CSBCaskS
NAME OF VARIABLE: CSBCaskS;
QUANTITY: 1;
REPORTING: Yes;

END CSBCaskS

TxCskBS
NAME OF VARIABLE: TxCskBS;
QUANTITY: 1;
REPORTING: Yes;

END TxCskBS

LastMCO
NAME OF VARIABLE: LastMCO;
QUANTITY: 4;
REPORTING: Yes;

END LastMCO

END SELECT

END DETAIL

INITIALISE
Add
*****
Time Units are in HOURS
*****
IKE Basic
Supply (1) = 200
IKW Basin
Supply (2) = 200
Wshift = WRetSh
EShift = ERetSh
CskLdMS = Days5
CskLdES = Days5E
TxToCVDS = Days5
VDShift = Days7
TxIK2ES = Days5
CSBCaskS = Days5
TxCskBS = Days5
End Actions
END INITIALISE

```

CASE 3. THREE 8HR SHIFTS/DAY, 5 DAYS/WEEK.
FUEL RETRIEVAL OPERATING AT 80% EFFICIENCY.

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week. With an 80% TOE on fuel retrieval

B-54

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week. With an 80% TOE on fuel retrieval

B-55

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week. With an 80% TOE on fuel retrieval

Number of casks in use

Time to process

WITNESS MODEL: B5TOE80

Base Model - 5 days/wk, 18 hrs/day
80% Efficiency

CLOCK

UNIT : Hours;
MULTIPLE : 1,Day,24,0;
MULTIPLE : 2,Week,7,0;
MULTIPLE : 3,,0,0;
RATIO : 1:1;
DISPLAY : USER;
END CLOCK

DETAIL

OPTIONS

BREAKDOWN MODEL: Mean;
PRN Stream : 1;
REPAIR MODEL: Actual;
LABOR TO UNLOAD : No;
WARMUP PERIOD : 0.00;
OUTPUT INTERVAL : None;
UNBLOCK BASIS : Priority;
MONITOR STEP : Undefined;
MIXTURE STEP : Undefined;
MODULE ELEMENT NAMES : Use local preferences;
END OPTIONS

SELECT

CskLoadW

NAME OF MACHINE: CskLoadW;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END

DISCRETE LINKS :
Fill: None

END

DISCRETE LINKS :
Empty: None

END

CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);

BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END

END BREAKDOWN DETAIL
ACTIONS, Finish

Add

CHANGE ALL to mco cask
countmco (1) = countmco (1) + 1
IF countmco (1) = 200
DESC = "LstW"

Done (3) = TIME

ENDIF

End Actions

INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(1)\$(1),
CskBuf\$(1);

OUTPUT RULE: PUSH to TxToCVD;

REPORTING: Individual;

SHIFT: CskLdWS,0,0;

END CskLoadW

Vacuum

NAME OF MACHINE: Vacuum;

QUANTITY: 6;

TYPE: Single;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :
Fill: None

END

DISCRETE LINKS :
Empty: None

END

CYCLE TIME: TRIANGLE (74,84,113,N + 6);

BREAKDOWN DETAIL

Breakdown number: 1

* Mode: Available time;

* Down interval: 40.0;

* Repair time: 40.0;

* Scrap part: No;

* Description: Breakdown Number 1

* Setup on repair: No;

* Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

Inote that its the first time through

PEN = 1

VacNops (1) = NOPS (Vacuum(1))

VacNops (2) = NOPS (Vacuum(2))

VacNops (3) = NOPS (Vacuum(3))

VacNops (4) = NOPS (Vacuum(4))

VacNops (5) = NOPS (Vacuum(5))

VacNops (6) = NOPS (Vacuum(6))

IF DESC = "LstW" OR DESC = "LstE"

LastMCO (1) = LastMCO (1) + 1

Done (6) = TIME

ENDIF

End Actions

INPUT RULE: Wait;

OUTPUT RULE: IF ISTATE (CSBask) = 1

PUSH to Tx1KToZE

ELSE

Wait

ENDIF;

REPORTING: Individual;

SHIFT: VDShift,0,0;

END Vacuum

MHC-SD-SNF-RPT-011
Rev. 0

MCO

NAME OF PART: MCO;
 TYPE: Variable attributes;
 GROUP NUMBER: 1;
 MAXIMUM ARRIVALS: 0;
 OUTPUT RULE: Wait;
 PART ROUTE: END
 REPORTING: Yes;
 CONTAINS FLUIDS: No;
 SHIFT: Undefined;

END MCO

FuelBasQ

NAME OF HISTOGRAM: FuelBasQ;
 QUANTITY: 1;
 STATS RESET: Yes;

END FuelBasQ

BasinBuf

NAME OF BUFFER: BasinBuf;
 QUANTITY: 2;
 CAPACITY: 2;
 DELAY MODE: None;
 INPUT POSITION: Rear;
 OUTPUT SCAN FROM: Front;
 * Select: First;
 ACTIONS, In

Add

I RECORD NPARTS (BasinBuf(2)) in FuelBasQ

ftotobs = INNUM (FuelBasQ)
 fcellone = INCELL (FuelBasQ,1)
 fonepc = cellone / totobs

End Actions

REPORTING: Individual;
 SHIFT: Undefined,0;

END BasinBuf

FuelRetW

NAME OF MACHINE: FuelRetW;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;

END

DISCRETE LINKS :
 Fill: None

END

DISCRETE LINKS :
 Empty: None

END

CYCLE TIME: TRIANGLE (36,37,50,N);
 BREAKDOWN DETAIL

- * Breakdown number: 1
- * Mode: Available time;
- * Down interval: 35.0;
- * Repair time: 11.0;
- * Scrap part: No;
- * Description: Breakdown Number 1

- * Setup on repair: No;
- * Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Start

Add

Supply (1) = Supply (1) - 1

End Actions

ACTIONS, Finish

Add

IF Supply (1) = 0

Done (1) = TIME

ENDIF

End Actions

INPUT RULE: IF Supply (1) > 0

PULL from MCO out of WORLD

ELSE

Wait

ENDIF;

OUTPUT RULE: PUSH to BasinBuf(1);

REPORTING: Individual;

SHIFT: Wshift,0,0;

END FuelRetW

besbufpc

NAME OF VARIABLE: besbufpc;

QUANTITY: 1;

REPORTING: Yes;

END besbufpc

Tx1KTo2E

NAME OF MACHINE: Tx1KTo2E;

QUANTITY: 1;

TYPE: Single;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (0.5,1,4,13);

BREAKDOWN DETAIL

Breakdown number: 1

* Mode: Available time;

* Down interval: 150.0;

* Repair time: 3.0;

* Scrap part: No;

* Description: Breakdown Number 1

* Setup on repair: No;

* Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

IF DESC = "LstW" OR DESC = "LstE"
 LastMCO (2) = LastMCO (2) + 1
 Done (7) = TIME
 ENDIF

End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to CSBCask;
 REPORTING: Individual;
 SHIFT: Tx1K2ES,0,0;

END Tx1KTo2E

MHMTx

NAME OF MACHINE: MHMTx;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;

END
 DISCRETE LINKS :
 Fill: None

END
 DISCRETE LINKS :
 Empty: None

END
 CYCLE TIME: TRIANGLE (3,3.25,4,15);
 BREAKDOWN DETAIL

Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 6.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;

END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add

IF PEN = 3
 Complete = Complete + 1
 IF MWIP (MCO) = 1 Iall MCO's are complete
 STOP
 ENDIF
 ENDIF

End Actions
 INPUT RULE: IF ISTATE (HotCond(1)) = 0
 Wait
 ELSE
 IF NPARTS (HotCond) > 5
 PULL from HotCond
 ELSE
 PULL from CSB
 ENDIF
 ENDIF

OUTPUT RULE: SELECT on PEN CSB,HotCond,SHIP;
 REPORTING: Individual;
 SHIFT: Days5,0,0;

END MHMTx

FuelRetE

NAME OF MACHINE: FuelRetE;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;

END
 DISCRETE LINKS :
 Fill: None

END
 DISCRETE LINKS :
 Empty: None

END
 CYCLE TIME: TRIANGLE (36,37,50,W);
 BREAKDOWN DETAIL

Breakdown number: 1
 * Mode: Available time;
 * Down interval: 35.0;
 * Repair time: 11.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;

END
 END BREAKDOWN DETAIL
 ACTIONS, Start
 Add

Supply (2) = Supply (2) - 1
 End Actions
 ACTIONS, Finish
 Add

IF Supply (2) = 0
 Done (2) = TIME
 ENDIF

End Actions
 INPUT RULE: IF Supply (2) > 0
 PULL from MCO out of WORLD
 ELSE
 Wait
 ENDIF;

OUTPUT RULE: PUSH to BasinBuf(2);
 REPORTING: Individual;
 SHIFT: Eshift,0,0;

END FuelRetE

CSBCask

NAME OF MACHINE: CSBCask;
 QUANTITY: 1;
 TYPE: Production;
 * Part type: EmpCask;
 * Production qty: 1;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;

END
 DISCRETE LINKS :
 Fill: None

END
 DISCRETE LINKS :
 Empty: None

END

CYCLE TIME: TRIANGLE (10.4,11.4,13.4,14);
BREAKDOWN_DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 300.0;
* Repair time: 6.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;

LABOR:
Repair: None;

END
END BREAKDOWN_DETAIL

ACTIONS, Finish
Add

CHANGE mco_cask to MCO
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (3) = LastMCO (3) + 1
ENDIF

End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH EmpCask to TxToCskB,MCO to MHMTX;
REPORTING: Individual;
SHIFT: CSBCaskS,0,0;

END CSBCask

HotCond

NAME OF MACHINE: HotCond;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: HC CTime;
BREAKDOWN_DETAIL

Breakdown number: 1
* Mode: Busy time;
* Down interval: 40.0;
* Repair time: 60.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;

LABOR:
Repair: None;

END
END BREAKDOWN_DETAIL

ACTIONS, Start

Add
x = RANDOM (98)
IF x < 0.8
HC CTime = 140
ELSE
HC CTime = 205
ENDIF
End Actions

ACTIONS, Finish
Add

PEN = 3
HCNOps (1) = NOPS (HotCond(1))
HCNOps (2) = NOPS (HotCond(2))
HCNOps (3) = NOPS (HotCond(3))
HCNOps (4) = NOPS (HotCond(4))
HCNOps (5) = NOPS (HotCond(5))
HCNOps (6) = NOPS (HotCond(6))
IF DESC = "LstW" OR DESC = "LstE"
Done (8) = TIME
ENDIF

End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to MHMTX;
REPORTING: Individual;
SHIFT: DelayHC,0,0;

END HotCond

Days5E

NAME OF SHIFT: Days5E;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 2184.000000;
SHIFT DATA: SD5_1day

SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day

REPORTING: Yes;

END Days5E

onepc

NAME OF VARIABLE: onepc;
QUANTITY: 1;
REPORTING: Yes;

END onepc

totobs

NAME OF VARIABLE: totobs;
QUANTITY: 1;
REPORTING: Yes;

END totobs

CSB

NAME OF BUFFER: CSB;
QUANTITY: 1;
CAPACITY: 1000;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add
make it its second pass
PEN = 2

End Actions
 REPORTING: Individual;
 SHIFT: Undefined,0;
 END CSB
 cellone
 NAME OF VARIABLE: cellone;
 QUANTITY: 1;
 REPORTING: Yes;
 END cellone
 CskLoadE
 NAME OF MACHINE: CskLoadE;
 QUANTITY: 1;
 TYPE: Assembly;
 * Assembly quantity: 2;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (12,16,9,26,N + 4);
 BREAKDOWN_DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 35.0;
 * Repair time: 7.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN_DETAIL
 ACTIONS, Finish
 Add
 CHANGE ALL to mco_cask
 countmco (2) = countmco (2) + 1
 IF countmco (2) = 200
 Done (4) = TIME
 DESC = "LstE"
 ENDIF
 End Actions
 INPUT RULE: SEQUENCE /Wait MCD out of BasinBuf(2)#(1),
 CaskBuf#(1);
 OUTPUT RULE: PUSH to TxToCVD;
 REPORTING: Individual;
 SHIFT: CskLdes,0,0;
 END CskLoadE
 Days5
 NAME OF SHIFT: Days5;
 TYPE OF SHIFT: main;
 OFFSET:

Working time: 0.000000;
 Rest time: 0.000000;
 ACTIONS, End
 Add
 IF Done (3) > 1 AND ISTATE (CskLoadM) <> 3
 CskLdMS = Woff
 ENDIF
 IF Done (4) > 1 AND ISTATE (CskLoadE) <> 3
 CskLDES = Eoff
 ENDIF
 IF countmco (1) = 200 AND countmco (2) = 200
 TxToCVDs = Eoff
 ENDIF
 IF LastMCO (1) = 2 AND ISTATE (Vacuum(1)) <> 3
 VDShift = Eoff
 ENDIF
 IF LastMCO (2) = 2 AND ISTATE (Tx1Kto2E) <> 3
 Tx1K2ES = Eoff
 ENDIF
 IF LastMCO (3) = 2 AND ISTATE (CSBCask) <> 3
 CSBCaskS = Eoff
 ENDIF
 IF LastMCO (4) = 2 AND ISTATE (TxToCskB) <> 3
 TxCskBS = Eoff
 ENDIF
 End Actions
 SHIFT DATA: SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5We;
 REPORTING: Yes;
 END Days5
 Complete
 NAME OF VARIABLE: Complete;
 QUANTITY: 1;
 REPORTING: Yes;
 END Complete
 Supply
 NAME OF VARIABLE: Supply;
 QUANTITY: 2;
 REPORTING: Yes;
 END Supply
 TxToCVD
 NAME OF MACHINE: TxToCVD;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None

MHC-SD-SNF-RPT-011
 Rev. 0

END
CYCLE TIME: TRIANGLE (0.1,0.25,0.5,13);
BREAKDOWN_DETAIL
Breakdown number: 1
• Mode: Available time;
• Down interval: 150.0;
• Repair time: 0.5;
• Scrap part: No;
• Description: Breakdown Number 1
• Setup on repair: No;
• Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
IF countmco (1) = 200 AND countmco (2) = 200
Done (5) = TIME
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to Vacuum;
REPORTING: Individual;
SHIFT: TxToCvds,0,0;
END TxToCvD
DelayHC
NAME OF SHIFT: DelayHC;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 6552.000000;
SHIFT DATA: 168.000000,0.000000,0.000000;
REPORTING: Yes;
END DelayHC
Done
NAME OF VARIABLE: Done;
QUANTITY: 8;
REPORTING: Yes;
END Done
VDryUse
NAME OF HISTOGRAM: VDryUse;
QUANTITY: 1;
STATS RESET : Yes;
END VDryUse
CaskBuf
NAME OF BUFFER: CaskBuf;
QUANTITY: 1;
CAPACITY: 100;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
• Select: First;
ACTIONS, In

Add
IRECORD NPARTS (CaskBuf) in CaskBufq
Itotobs = INNUM (CaskBufq)
lcellone = INCELL (CaskBufq,1)
lonepc = cellone / totobs
End Actions
ACTIONS, Out
Add
RECORD 9 - NPARTS (CaskBuf) in CaskBufq
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;
END CaskBuf
EmpCask
NAME OF PART: EmpCask;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 9;
INTER ARRIVAL TIME: Undefined;
FIRST ARRIVAL AT: 0.0;
LOT SIZE: 9;
OUTPUT RULE: PUSH to CaskBuf;
PART ROUTE: None
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;
END EmpCask
mco_cask
NAME OF PART: mco_cask;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: None
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;
END mco_cask
TxToCskB
NAME OF MACHINE: TxToCskB;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: TRIANGLE (0.5,1,4,13);
BREAKDOWN_DETAIL
Breakdown number: 1
• Mode: Available time;
• Down interval: 150.0;

MHC-SD-SNF-RPT-011
Rev. 0

LOCATING

- * Repair time: 3.0;
- * Scrap part: No;
- * Description: Breakdown Number 1
- * Setup on repair: No;
- * Check at cycle start only: Yes;

LABOR:
Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

LastMCO (4) = LastMCO (3)

End Actions

INPUT RULE: Wait;

OUTPUT RULE: PUSH to CaskBuf;

REPORTING: Individual;

SHIFT: TxCskBS,0,0;

END TxToCskB

CaskTot

NAME OF VARIABLE: CaskTot;

QUANTITY: 1;

REPORTING: Yes;

END CaskTot

No_CaskW

NAME OF VARIABLE: No_CaskW;

QUANTITY: 1;

REPORTING: Yes;

END No_CaskW

No_CaskE

NAME OF VARIABLE: No_CaskE;

QUANTITY: 1;

REPORTING: Yes;

END No_CaskE

HC_CTime

NAME OF VARIABLE: HC_CTime;

QUANTITY: 1;

REPORTING: Yes;

END HC_CTime

x

NAME OF VARIABLE: x;

QUANTITY: 1;

REPORTING: Yes;

END x

CaskBufQ

NAME OF HISTOGRAM: CaskBufQ;

QUANTITY: 1;

STATS RESET : Yes;

END CaskBufQ

FRWest

NAME OF LABOR: FRWest;

QUANTITY no shift: 1;

REPORTING: Yes;

END FRWest

countmco

NAME OF VARIABLE: countmco;

QUANTITY: 4;

REPORTING: Yes;

END countmco

VacNOps

NAME OF VARIABLE: VacNOps;

QUANTITY: 6;

REPORTING: Yes;

END VacNOps

SD5_1day

NAME OF SHIFT: SD5_1day;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: 18.000000,6.000000,0.000000;

REPORTING: Yes;

END SD5_1day

SD5We

NAME OF SHIFT: SD5We;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: 0.000000,48.000000,0.000000;

REPORTING: Yes;

END SD5We

HCNOps

NAME OF VARIABLE: HCNOps;

QUANTITY: 6;

REPORTING: Yes;

END HCNOps

WRU1_Day

NAME OF SHIFT: WRU1_Day;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: 2.000000,22.000000,0.000000;

REPORTING: Yes;

END WRU1_Day

WRU2_Day

NAME OF SHIFT: WRU2_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 5.000000,19.000000,0.000000;
REPORTING: Yes;

END WRU2_Day

WRU3_Day

NAME OF SHIFT: WRU3_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 8.000000,16.000000,0.000000;
REPORTING: Yes;

END WRU3_Day

WRU4_Day

NAME OF SHIFT: WRU4_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 11.000000,13.000000,0.000000;
REPORTING: Yes;

END WRU4_Day

WRU5_Day

NAME OF SHIFT: WRU5_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 14.000000,10.000000,0.000000;
REPORTING: Yes;

END WRU5_Day

WRU6_Day

NAME OF SHIFT: WRU6_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 17.000000,7.000000,0.000000;
REPORTING: Yes;

END WRU6_Day

WRU7_Day

NAME OF SHIFT: WRU7_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END WRU7_Day

ERU4_Day

NAME OF SHIFT: ERU4_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 3.000000,21.000000,0.000000;
REPORTING: Yes;

END ERU4_Day

ERU5_Day

NAME OF SHIFT: ERU5_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 9.000000,15.000000,0.000000;
REPORTING: Yes;

END ERU5_Day

ERU6_Day

NAME OF SHIFT: ERU6_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 15.000000,9.000000,0.000000;
REPORTING: Yes;

END ERU6_Day

ERU7_Day

NAME OF SHIFT: ERU7_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END ERU7_Day

ERU4_Mon

NAME OF SHIFT: ERU4_Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU4_Day

B-64

ERU4_Day
 ERU4_Day
 ERU4_Day
 ERU4_Day
 SD5We
 ERU4_Day
 ERU4_Day
 ERU4_Day
 ERU4_Day
 ERU4_Day
 SD5We
 ERU4_Day
 ERU4_Day
 ERU4_Day
 ERU4_Day
 ERU4_Day
 SD5We
 ERU4_Day
 ERU4_Day;
 REPORTING: Yes;

END ERU4_Mon

ERU5_Mon

NAME OF SHIFT: ERU5_Mon;
 TYPE OF SHIFT: sub shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: ERU5_Day
 ERU5_Day
 ERU5_Day
 ERU5_Day
 ERU5_Day
 SD5We
 ERU5_Day
 ERU5_Day
 ERU5_Day
 ERU5_Day
 ERU5_Day
 ERU5_Day
 SD5We
 ERU5_Day
 ERU5_Day
 ERU5_Day
 ERU5_Day
 ERU5_Day
 SD5We
 ERU5_Day
 ERU5_Day;
 REPORTING: Yes;
 END ERU5_Mon

ERU6_Mon

NAME OF SHIFT: ERU6_Mon;
 TYPE OF SHIFT: sub Shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: ERU6_Day
 ERU6_Day
 ERU6_Day
 ERU6_Day
 SD5We
 ERU6_Day
 ERU6_Day
 ERU6_Day
 ERU6_Day
 ERU6_Day
 SD5We
 ERU6_Day
 ERU6_Day
 ERU6_Day
 ERU6_Day
 SD5We
 ERU6_Day
 ERU6_Day
 ERU6_Day
 ERU6_Day
 SD5We
 ERU6_Day
 ERU6_Day;
 REPORTING: Yes;

END ERU6_Mon

ERU7_Mon

NAME OF SHIFT: ERU7_Mon;
 TYPE OF SHIFT: sub Shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: ERU7_Day
 ERU7_Day
 ERU7_Day
 ERU7_Day
 ERU7_Day
 SD5We;
 REPORTING: Yes;
 END ERU7_Mon

WRU1_Mon

NAME OF SHIFT: WRU1_Mon;
 TYPE OF SHIFT: sub Shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: WRU1_Day
 WRU1_Day
 WRU1_Day
 WRU1_Day

WRU1_Day
SD5We
WRU1_Day
WRU1_Day
WRU1_Day
WRU1_Day
SD5We
WRU1_Day
WRU1_Day
WRU1_Day
WRU1_Day
WRU1_Day
SD5We
WRU1_Day
WRU1_Day
WRU1_Day
WRU1_Day
SD5We
WRU1_Day
WRU1_Day;
REPORTING: Yes;

END WRU1_Mon

WRU2_Mon

NAME OF SHIFT: WRU2_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU2_Day

WRU2_Day
WRU2_Day
WRU2_Day
WRU2_Day
SD5We
WRU2_Day
WRU2_Day
WRU2_Day
WRU2_Day
WRU2_Day
SD5We
WRU2_Day
WRU2_Day
WRU2_Day
WRU2_Day
WRU2_Day
SD5We
WRU2_Day
WRU2_Day
WRU2_Day;
REPORTING: Yes;

END WRU2_Mon

WRU3_Mon

NAME OF SHIFT: WRU3_Mon;

TYPE OF SHIFT: sub shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: WRU3_Day

WRU3_Day
WRU3_Day
WRU3_Day
SD5We
WRU3_Day
WRU3_Day
WRU3_Day
WRU3_Day
SD5We
WRU3_Day
WRU3_Day
WRU3_Day
WRU3_Day
SD5We
WRU3_Day
WRU3_Day
WRU3_Day
WRU3_Day
SD5We
WRU3_Day
WRU3_Day;
REPORTING: Yes;

END WRU3_Mon

WRU4_Mon

NAME OF SHIFT: WRU4_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU4_Day

WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
SD5We
WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
SD5We
WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
SD5We
WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
SD5We

WRU4 Day
WRU4 Day;
REPORTING: Yes;

END WRU4_Mon

WRU5_Mon

NAME OF SHIFT: WRU5 Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU5_Day

WRU5 Day
WRU5 Day
WRU5 Day
WRU5 Day
SD5We
WRU5 Day
WRU5 Day
WRU5 Day
WRU5 Day
WRU5 Day
SD5We
WRU5 Day
WRU5 Day
WRU5 Day
WRU5 Day
WRU5 Day
SD5We
WRU5 Day
WRU5 Day
WRU5 Day
WRU5 Day
SD5We
WRU5 Day
WRU5 Day;
REPORTING: Yes;

END WRU5_Mon

WRU6_Mon

NAME OF SHIFT: WRU6 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU6_Day

WRU6 Day
WRU6 Day
WRU6 Day
WRU6 Day
SD5We
WRU6 Day
WRU6 Day
WRU6 Day
WRU6 Day
WRU6 Day
SD5We
WRU6 Day
WRU6 Day
WRU6 Day
WRU6 Day

WRU6 Day
SD5We
WRU6 Day
WRU6 Day
WRU6 Day
WRU6 Day
SD5We
WRU6 Day
WRU6 Day
WRU6 Day;
REPORTING: Yes;

END WRU6_Mon

WRU7_Mon

NAME OF SHIFT: WRU7 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU7_Day

WRU7 Day
WRU7 Day
WRU7 Day
SD5We;
REPORTING: Yes;

END WRU7_Mon

WRetSh

NAME OF SHIFT: WRetSh;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
ACTIONS, End
Add
IF TIME > 4368
Wshift = WShRep
IF Done (1) > 1
Wshift = Woff
ENDIF

ENDIF

End Actions

SHIFT DATA: WRU1_Mon

WRU2_Mon
WRU3_Mon
WRU4_Mon
WRU5_Mon
WRU6_Mon;

REPORTING: Yes;

END WRetSh

ERetSh

NAME OF SHIFT: ERetSh;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 2184.000000;
ACTIONS, End

Add
 IF TIME > 4368
 EShift = EShRep
 IF Done (2) > 1
 EShift = Eoff
 ENDIF
 ENDIF
 End Actions
 SHIFT DATA: ERU4_Mon
 ERU5_Mon
 ERU6_Mon;
 REPORTING: Yes;
 END ERetSh
 Wshift
 NAME OF VARIABLE: Wshift;
 QUANTITY: 1;
 REPORTING: Yes;
 END Wshift
 WShRep
 NAME OF SHIFT: WShRep;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: WRU7_Mon;
 REPORTING: Yes;
 END WShRep
 EShRep
 NAME OF SHIFT: EShRep;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: ERU7_Mon;
 REPORTING: Yes;
 END EShRep
 EShift
 NAME OF VARIABLE: EShift;
 QUANTITY: 1;
 REPORTING: Yes;
 END EShift
 Eoff
 NAME OF SHIFT: Eoff;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 0.000000,168.000000,0.000000;
 REPORTING: Yes;
 END Eoff

Woff
 NAME OF SHIFT: Woff;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 0.000000,168.000000,0.000000;
 REPORTING: Yes;
 END Woff
 Days7
 NAME OF SHIFT: Days7;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 168.000000,0.000000,0.000000;
 REPORTING: Yes;
 END Days7
 VDShift
 NAME OF VARIABLE: VDShift;
 QUANTITY: 1;
 REPORTING: Yes;
 END VDShift
 CskLdWS
 NAME OF VARIABLE: CskLdWS;
 QUANTITY: 1;
 REPORTING: Yes;
 END CskLdWS
 CskLdES
 NAME OF VARIABLE: CskLdES;
 QUANTITY: 1;
 REPORTING: Yes;
 END CskLdES
 TxToCVDS
 NAME OF VARIABLE: TxToCVDS;
 QUANTITY: 1;
 REPORTING: Yes;
 END TxToCVDS
 Tx1K2ES
 NAME OF VARIABLE: Tx1K2ES;
 QUANTITY: 1;
 REPORTING: Yes;
 END Tx1K2ES
 CSBcaskS

```
NAME OF VARIABLE: CSBCaskS;  
QUANTITY: 1;  
REPORTING: Yes;  
  
END CSBCaskS  
  
TxCskBS  
  
NAME OF VARIABLE: TxCskBS;  
QUANTITY: 1;  
REPORTING: Yes;  
  
END TxCskBS  
  
LastMCO  
  
NAME OF VARIABLE: LastMCO;  
QUANTITY: 4;  
REPORTING: Yes;  
  
END LastMCO  
  
END SELECT  
  
END DETAIL  
  
INITIALISE  
Add  
|*****  
|  
|      Time Units are in HOURS  
|*****  
IKE Basic  
  Supply (1) = 200  
IKW Basin  
  Supply (2) = 200  
  Wshift = WRetSh  
  Eshift = ERetSh  
  CskLdWS = Days5  
  CskLdES = Days5E  
  TxToCVDs = Days5  
  VdShift = Days7  
  TxIKZES = Days5  
  CSBCaskS = Days5  
  TxCskBS = Days5  
  End Actions  
END INITIALISE
```


CASE 4. THREE 8 HR SHIFTS/DAY, 5 DAYS/WEEK.
FUEL RETRIEVAL CYCLE TIMES OF MIN = 16, MODE = 17, AND MAX = 30.

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week. With a (16, 17, 30) distribution on fuel retrieval

B-71

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week. With a (16, 17, 30) distribution on fuel retrieval

B-72

WMC-SD-SNF-RPT-011
 Rev. 0

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week. With a (16, 17, 30) distribution on fuel retrieval

B-73

I WITNESS MODEL: B5SHRET

Base Model - 5 days/wk, 18 hrs/day
Short Retrieval time for East and West
(16,17,30)

CLOCK

UNIT : Hours;
MULTIPLE : 1,Day,24,0;
MULTIPLE : 2,Week,7,0;
MULTIPLE : 3,,0,0;
RATIO : 1:1;
DISPLAY : USER;
END CLOCK

DETAIL

OPTIONS

BREAKDOWN MODEL: Mean;
PRN Stream : 1;
REPAIR MODEL: Actual;
LABOR TO UNLOAD : No;
WARMUP PERIOD : 0.00;
OUTPUT INTERVAL : None;
UNBLOCK BASIS : Priority;
MONITOR STEP : Undefined;
MIXTURE STEP : Undefined;
MODULE ELEMENT NAMES : Use local preferences;
END OPTIONS

SELECT

CskLoadW

NAME OF MACHINE: CskLoadW;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (12,16,9,26,N + 4);

BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add

CHANGE ALL to mco_cask
countmco (1) = countmco (1) + 1

IF countmco (1) = 200
DESC = "LstW"
Done (3) = TIME
ENDIF
End Actions
INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(1)#{1},
CaskBuf#(1);
OUTPUT RULE: IF ISTATE (Vacuum(1)) = 1 OR ISTATE (Vacuum(2)) = 1 OR ISTATE
(Vacuum(3)) = 1 OR ISTATE (Vacuum(4)) = 1 OR ISTATE (Vacuum(5)) = 1 OR ISTATE
(Vacuum(6)) = 1

PUSH to TxToCVD
ELSE
Wait
ENDIF;

REPORTING: Individual;
SHIFT: CskLows,0,0;

END CskLoadW

Vacuum

NAME OF MACHINE: Vacuum;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (74,84,113,N + 6);

BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 40.0;
* Repair time: 40.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add

Inote that its the first time through

PEN = 1
VacNops (1) = NOPS (Vacuum(1))
VacNops (2) = NOPS (Vacuum(2))
VacNops (3) = NOPS (Vacuum(3))
VacNops (4) = NOPS (Vacuum(4))
VacNops (5) = NOPS (Vacuum(5))
VacNops (6) = NOPS (Vacuum(6))
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (1) = LastMCO (1) + 1
Done (6) = TIME
ENDIF

End Actions
INPUT RULE: Wait;
OUTPUT RULE: IF ISTATE (CSBCask) = 1
PUSH to Tx1KToZE

```

ELSE
  Wait
ENDIF;
REPORTING: Individual;
SHIFT: VShift,0,0;

END Vacuum

MCO

NAME OF PART: MCO;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: END
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END MCO

FuelBasQ

NAME OF HISTOGRAM: FuelBasQ;
QUANTITY: 1;
STATS RESET: Yes;

END FuelBasQ

BasinBuf

NAME OF BUFFER: BasinBuf;
QUANTITY: 2;
CAPACITY: 2;
DELAY MODE: None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add
I RECORD NPARTS (BasinBuf(2)) in FuelBasQ
Itotobs = INNUM (FuelBasQ)
Icellone = IHCCELL (FuelBasQ,1)
Ionepc = cellone / totobs
END ACTIONS
REPORTING: Individual;
SHIFT: Undefined,0;

END BasinBuf

FuelRetW

NAME OF MACHINE: FuelRetW;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END

```

```

CYCLE TIME: TRIANGLE (16,17,30,W);
BREAKDOWN DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 35.0;
  * Repair time: 9.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Start
Add
  Supply (1) = Supply (1) - 1
End Actions
ACTIONS, Finish
Add
  IF Supply (1) = 0
    Done (1) = TIME
  ENDIF
End Actions
INPUT RULE: IF Supply (1) > 0
  PULL from MCO out of WORLD
ELSE
  Wait
ENDIF;
OUTPUT RULE: PUSH to BasinBuf(1);
REPORTING: Individual;
SHIFT: Wshift,0,0;

END FuelRetW

basbuffpc

NAME OF VARIABLE: basbuffpc;
QUANTITY: 1;
REPORTING: Yes;

END basbuffpc

Tx1KtO2E

NAME OF MACHINE: Tx1KtO2E;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (0.5,1,4,13);
BREAKDOWN DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 150.0;
  * Repair time: 3.0;
  * Scrap part: No;
  * Description: Breakdown Number 1

```

```

* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
  IF DESC = "LstW" OR DESC = "LstE"
    LastMCO (2) = LastMCO (2) + 1
    Done (7) = TIME
  ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to CSBCask;
REPORTING: Individual;
SHIFT: Tx1K2ES,0,0;

END Tx1KTo2E

MHMTx

NAME OF MACHINE: MHMTx;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (3,3.25,4,15);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 150.0;
  * Repair time: 6.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
  IF PEN = 3
    Complete = Complete + 1
    IF NWIP (MCO) = 1 !all MCO's are complete
      STOP
    ENDIF
  ENDIF
End Actions
INPUT RULE: IF ISTATE (HotCond(1)) = 0
  Wait
ELSE
  IF NPARTS (HotCond) > 5
    PULL from HotCond
  ELSE
    PULL from CSB
  ENDIF

```

```

ENDIF;
OUTPUT RULE: SELECT on PEN CSB,HotCond,SHIP;
REPORTING: Individual;
SHIFT: Days5,0,0;

```

END MHMTx

FuelRetE

```

NAME OF MACHINE: FuelRetE;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (16,17,30,N);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 35.0;
  * Repair time: 9.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
LABOR:
  Repair: None;
END

```

END
END BREAKDOWN_DETAIL

ACTIONS, Start
Add

Supply (2) = Supply (2) - 1

End Actions

ACTIONS, Finish

Add

IF Supply (2) = 0

Done (2) = TIME

ENDIF

End Actions

INPUT RULE: IF Supply (2) > 0

PULL from MCO out of WORLD

ELSE

Wait

ENDIF

OUTPUT RULE: PUSH to BasinBuf(2);

REPORTING: Individual;

SHIFT: EShift,0,0;

END FuelRetE

CSBCask

```

NAME OF MACHINE: CSBCask;
QUANTITY: 1;
TYPE: Production;
* Part type: EmpCask;
* Production qty: 1;
PRIORITY: Lowest;
LABOR:

```

Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (10.4,11.4,13.4,14);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 300.0;
 * Repair time: 6.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 CHANGE mco cask to MCO
 IF DESC = "LstW" OR DESC = "LstE"
 LastMCO (3) = LastMCO (3) + 1
 ENDIF
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH EmpCask to TxToCskB,MCO to MHMTx;
 REPORTING: Individual;
 SHIFT: CSBCaskS,0,0;
 END CSBCask
 HotCond
 NAME OF MACHINE: HotCond;
 QUANTITY: 6;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: HC Ctime;
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Busy time;
 * Down interval: 40.0;
 * Repair time: 60.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Start

Add
 x = RANDOM (98)
 IF x < 0.8
 HC Ctime = 140
 ELSE
 HC Ctime = 205
 ENDIF
 End Actions
 ACTIONS, Finish
 Add
 PEN = 3
 HCNops (1) = NOPS (HotCond(1))
 HCNops (2) = NOPS (HotCond(2))
 HCNops (3) = NOPS (HotCond(3))
 HCNops (4) = NOPS (HotCond(4))
 HCNops (5) = NOPS (HotCond(5))
 HCNops (6) = NOPS (HotCond(6))
 IF DESC = "LstW" OR DESC = "LstE"
 Done (8) = TIME
 ENDIF
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to MHMTx;
 REPORTING: Individual;
 SHIFT: DelayHC,0,0;
 END HotCond
 Days5E
 NAME OF SHIFT: Days5E;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 2184.000000;
 SHIFT DATA: SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 REPORTING: Yes;
 END Days5E
 onepc
 NAME OF VARIABLE: onepc;
 QUANTITY: 1;
 REPORTING: Yes;
 END onepc
 totobs
 NAME OF VARIABLE: totobs;
 QUANTITY: 1;
 REPORTING: Yes;
 END totobs
 CSB
 NAME OF BUFFER: CSB;
 QUANTITY: 1;
 CAPACITY: 1000;


```

DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
# Select: First;
ACTIONS, In
Add
Imake it its second pass
PEN = 2
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END CSB

cellone

NAME OF VARIABLE: cellone;
QUANTITY: 1;
REPORTING: Yes;

END cellone

CskLoadE

NAME OF MACHINE: CskLoadE;
QUANTITY: 1;
TYPE: Assembly;
# Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);
BREAKDOWN DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 35.0;
  * Repair time: 7.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add
CHANGE ALL to mco_cask
countmco (2) = countmco (2) + 1
IF countmco (2) = 200
  Done (4) = TIME
  DESC = "LstE"
ENDIF
End Actions
INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(2)#{1},
  CaskBuf#{1};
OUTPUT RULE: IF ISTATE (Vacuum(1)) = 1 OR ISTATE (Vacuum(2)) = 1 OR ISTATE
(Vacuum(3)) = 1 OR ISTATE (Vacuum(4)) = 1 OR ISTATE (Vacuum(5)) = 1 OR ISTATE
(Vacuum(6)) = 1

```

```

PUSH to TxToCVD
ELSE
  Wait
ENDIF;
REPORTING: Individual;
SHIFT: CskLdEs,0,0;

END CskLoadE

Days5

NAME OF SHIFT: Days5;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
ACTIONS, End
Add
  IF Done (3) > 1 AND ISTATE (CskLoadM) <> 3
    CskLdMS = Woff
  ENDIF
  IF Done (4) > 1 AND ISTATE (CskLoadE) <> 3
    CskLdES = Eoff
  ENDIF
  IF countmco (1) = 200 AND countmco (2) = 200
    TxToCVDs = Eoff
  ENDIF
  IF LastMCO (1) = 2 AND ISTATE (Vacuum(1)) <> 3
    VDShift = Eoff
  ENDIF
  IF LastMCO (2) = 2 AND ISTATE (Tx1Kto2E) <> 3
    Tx1K2ES = Eoff
  ENDIF
  IF LastMCO (3) = 2 AND ISTATE (CSBCask) <> 3
    CSBCasks = Eoff
  ENDIF
  IF LastMCO (4) = 2 AND ISTATE (TxToCskB) <> 3
    TxCskBS = Eoff
  ENDIF
End Actions
SHIFT DATA: SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5We;
REPORTING: Yes;

END Days5

Complete

NAME OF VARIABLE: Complete;
QUANTITY: 1;
REPORTING: Yes;

END Complete

Supply

NAME OF VARIABLE: Supply;
QUANTITY: 2;
REPORTING: Yes;

END Supply

```

TxToCVD

NAME OF MACHINE: TxToCVD;

QUANTITY: 1;

TYPE: Single;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :
Fill: None

END

DISCRETE LINKS :
Empty: None

END

CYCLE TIME: TRIANGLE (0.1,0.25,0.5,13);

BREAKDOWN DETAIL

Breakdown number: 1

• Mode: Available time;

• Down interval: 150.0;

• Repair time: 0.5;

• Scrap part: No;

• Description: Breakdown Number 1

• Setup on repair: No;

• Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

IF countmco (1) = 200 AND countmco (2) = 200

Done (5) = TIME

ENDIF

End Actions

INPUT RULE: Wait;

OUTPUT RULE: PUSH to Vacuum;

REPORTING: Individual;

SHIFT: TxToCVD,0,0;

END TxToCVD

DelayHC

NAME OF SHIFT: DelayHC;

TYPE OF SHIFT: main;

OFFSET:

Working time: 0.000000;

Rest time: 6552.000000;

SHIFT DATA: 168.000000,0.000000,0.000000;

REPORTING: Yes;

END DelayHC

Done

NAME OF VARIABLE: Done;

QUANTITY: 8;

REPORTING: Yes;

END Done

VDryUse

NAME OF HISTOGRAM: VDryUse;

QUANTITY: 1;

STATS RESET : Yes;

END VDryUse

CaskBuf

NAME OF BUFFER: CaskBuf;

QUANTITY: 1;

CAPACITY: 100;

DELAY MODE : None;

INPUT POSITION: Rear;

OUTPUT SCAN FROM: Front;

* Select: First;

ACTIONS, In

Add

IRECORD NPARTS (CaskBuf) in CaskBufQ

Itotobs = INNUM (CaskBufQ)

Icellone = INCELL (CaskBufQ,1)

Ionepc = cellone / totobs

End Actions

ACTIONS, Out

Add

RECORD 9 - NPARTS (CaskBuf) in CaskBufQ

End Actions

REPORTING: Individual;

SHIFT: Undefined,0;

END CaskBuf

EmpCask

NAME OF PART: EmpCask;

TYPE: Variable attributes;

GROUP NUMBER: 1;

MAXIMUM ARRIVALS: 9;

INTER ARRIVAL TIME: Undefined;

FIRST ARRIVAL AT: 0.0;

LOT SIZE: 9;

OUTPUT RULE: PUSH to CaskBuf;

PART ROUTE: None

REPORTING: Yes;

CONTAINS FLUIDS: No;

SHIFT: Undefined;

END EmpCask

mco_cask

NAME OF PART: mco_cask;

TYPE: Variable attributes;

GROUP NUMBER: 1;

MAXIMUM ARRIVALS: 0;

OUTPUT RULE: Wait;

PART ROUTE: None

REPORTING: Yes;

CONTAINS FLUIDS: No;

SHIFT: Undefined;

END mco_cask

TxToCskB

NAME OF MACHINE: TxToCskB;

QUANTITY: 1;

TYPE: Single;

PRIORITY: Lowest;

LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (0.5,1,4,13);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 3.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 LastMCO (4) = LastMCO (3)
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to CaskBuf;
 REPORTING: Individual;
 SHIFT: TxCskS,0,0;
 END TxToCskB
 CaskTot
 NAME OF VARIABLE: CaskTot;
 QUANTITY: 1;
 REPORTING: Yes;
 END CaskTot
 No_CaskW
 NAME OF VARIABLE: No_CaskW;
 QUANTITY: 1;
 REPORTING: Yes;
 END No_CaskW
 No_CaskE
 NAME OF VARIABLE: No_CaskE;
 QUANTITY: 1;
 REPORTING: Yes;
 END No_CaskE
 HC_CTime
 NAME OF VARIABLE: HC_CTime;
 QUANTITY: 1;
 REPORTING: Yes;
 END HC_CTime

x
 NAME OF VARIABLE: x;
 QUANTITY: 1;
 REPORTING: Yes;
 END x
 CaskBufQ
 NAME OF HISTOGRAM: CaskBufQ;
 QUANTITY: 1;
 STATS RESET: Yes;
 END CaskBufQ
 FRWest
 NAME OF LABOR: FRWest;
 QUANTITY no shift: 1;
 REPORTING: Yes;
 END FRWest
 countmco
 NAME OF VARIABLE: countmco;
 QUANTITY: 4;
 REPORTING: Yes;
 END countmco
 VacNops
 NAME OF VARIABLE: VacNops;
 QUANTITY: 6;
 REPORTING: Yes;
 END VacNops
 SD5_1day
 NAME OF SHIFT: SD5_1day;
 TYPE OF SHIFT: sub shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 18.000000,6.000000,0.000000;
 REPORTING: Yes;
 END SD5_1day
 SD5We
 NAME OF SHIFT: SD5We;
 TYPE OF SHIFT: sub shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 0.000000,48.000000,0.000000;
 REPORTING: Yes;
 END SD5We
 HCNops

NAME OF VARIABLE: HCNOps;
QUANTITY: 6;
REPORTING: Yes;

END HCNOps

WRU1_Day

NAME OF SHIFT: WRU1_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 2.000000,22.000000,0.000000;
REPORTING: Yes;

END WRU1_Day

WRU2_Day

NAME OF SHIFT: WRU2_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 5.000000,19.000000,0.000000;
REPORTING: Yes;

END WRU2_Day

WRU3_Day

NAME OF SHIFT: WRU3_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 8.000000,16.000000,0.000000;
REPORTING: Yes;

END WRU3_Day

WRU4_Day

NAME OF SHIFT: WRU4_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 11.000000,13.000000,0.000000;
REPORTING: Yes;

END WRU4_Day

WRU5_Day

NAME OF SHIFT: WRU5_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 14.000000,10.000000,0.000000;
REPORTING: Yes;

END WRU5_Day

WRU6_Day

NAME OF SHIFT: WRU6_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 17.000000,7.000000,0.000000;
REPORTING: Yes;

END WRU6_Day

WRU7_Day

NAME OF SHIFT: WRU7_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END WRU7_Day

ERU4_Day

NAME OF SHIFT: ERU4_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 3.000000,21.000000,0.000000;
REPORTING: Yes;

END ERU4_Day

ERU5_Day

NAME OF SHIFT: ERU5_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 9.000000,15.000000,0.000000;
REPORTING: Yes;

END ERU5_Day

ERU6_Day

NAME OF SHIFT: ERU6_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 15.000000,9.000000,0.000000;
REPORTING: Yes;

END ERU6_Day

ERU7_Day

NAME OF SHIFT: ERU7_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;

B-81

Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END ERU7_Day

ERU4_Mon

NAME OF SHIFT: ERU4_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU4_Day

ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
SD5We
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
SD5We
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
SD5We
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
SD5We
ERU4_Day
ERU4_Day;
REPORTING: Yes;

END ERU6_Mon

ERU5_Mon

NAME OF SHIFT: ERU5_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU5_Day

ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
SD5We
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
SD5We
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day

ERU5_Day
SD5We
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
SD5We
ERU5_Day
ERU5_Day;
REPORTING: Yes;

END ERU5_Mon

ERU6_Mon

NAME OF SHIFT: ERU6_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU6_Day

ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
SD5We
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
SD5We
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
SD5We
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
SD5We
ERU6_Day
ERU6_Day;
REPORTING: Yes;

END ERU6_Mon

ERU7_Mon

NAME OF SHIFT: ERU7_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU7_Day

ERU7_Day
ERU7_Day
ERU7_Day
ERU7_Day
SD5We;
REPORTING: Yes;

B-82

WRU4_Day
SD5Wc
WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
SD5Wc
WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
SD5Wc
WRU4_Day
WRU4_Day;
REPORTING: Yes;

END WRU4_Mon

WRU5_Mon

NAME OF SHIFT: WRU5_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU5_Day

WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SD5Wc
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SD5Wc
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SD5Wc
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SD5Wc
WRU5_Day
WRU5_Day;
REPORTING: Yes;

END WRU5_Mon

END WRU6_Mon

WRU6_Mon

NAME OF SHIFT: WRU6_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU6_Day
WRU6_Day

WRU6_Day
WRU6_Day
WRU6_Day
SD5Wc
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SD5Wc
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SD5Wc
WRU6_Day
WRU6_Day
WRU6_Day
SD5Wc
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SD5Wc
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day;
REPORTING: Yes;

END WRU6_Mon

WRU7_Mon

NAME OF SHIFT: WRU7_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU7_Day

WRU7_Day
WRU7_Day
WRU7_Day
WRU7_Day
SD5Wc
REPORTING: Yes;

END WRU7_Mon

WRetSh

NAME OF SHIFT: WRetSh;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
ACTIONS, End
Add

IF TIME > 4368
Wshift = WshRep
IF Done (1) > 1
Wshift = Woff
ENDIF

End Actions
SHIFT DATA: WRU1_Mon
WRU2_Mon
WRU3_Mon
WRU4_Mon

WRU5 Mon
 WRU6 Mon;
 REPORTING: Yes;

 END WRetSh

 ERetSh

 NAME OF SHIFT: ERetSh;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 2184.000000;
 ACTIONS, End
 Add
 IF TIME > 4368
 EShift = EShRep
 IF Done (2) > 1
 EShift = Eoff
 ENDIF
 ENDIF
 End Actions
 SHIFT DATA: ERU4_Mon
 ERU5 Mon
 ERU6 Mon;
 REPORTING: Yes;

 END ERetSh

 Wshift

 NAME OF VARIABLE: Wshift;
 QUANTITY: 1;
 REPORTING: Yes;

 END Wshift

 WShRep

 NAME OF SHIFT: WShRep;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: WRU7 Mon;
 REPORTING: Yes;

 END WShRep

 EShRep

 NAME OF SHIFT: EShRep;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: ERU7_Mon;
 REPORTING: Yes;

 END EShRep

 EShift

 NAME OF VARIABLE: EShift;
 QUANTITY: 1;
 REPORTING: Yes;

END Eshift

 Eoff

 NAME OF SHIFT: Eoff;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 0.000000,168.000000,0.000000;
 REPORTING: Yes;

 END Eoff

 Woff

 NAME OF SHIFT: Woff;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 0.000000,168.000000,0.000000;
 REPORTING: Yes;

 END Woff

 Days7

 NAME OF SHIFT: Days7;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 168.000000,0.000000,0.000000;
 REPORTING: Yes;

 END Days7

 VShift

 NAME OF VARIABLE: VShift;
 QUANTITY: 1;
 REPORTING: Yes;

 END VShift

 CskLdMS

 NAME OF VARIABLE: CskLdMS;
 QUANTITY: 1;
 REPORTING: Yes;

 END CskLdMS

 CskLdES

 NAME OF VARIABLE: CskLdES;
 QUANTITY: 1;
 REPORTING: Yes;

 END CskLdES

 TxToCVDS

 NAME OF VARIABLE: TxToCVDS;


```

QUANTITY: 1;
REPORTING: Yes;

END TxToCVDs

Tx1K2ES

NAME OF VARIABLE: Tx1K2ES;
QUANTITY: 1;
REPORTING: Yes;

END Tx1K2ES

CSBCaskS

NAME OF VARIABLE: CSBCaskS;
QUANTITY: 1;
REPORTING: Yes;

END CSBCaskS

TxCskBS

NAME OF VARIABLE: TxCskBS;
QUANTITY: 1;
REPORTING: Yes;

END TxCskBS

LastMCO

NAME OF VARIABLE: LastMCO;
QUANTITY: 4;
REPORTING: Yes;

END LastMCO

END SELECT

END DETAIL

INITIALISE
Add
*****
|
|           Time Units are in HOURS
|
*****
1KE Basic
  Supply (1) = 200
1KW Basin
  Supply (2) = 200
  Wshift = WRetSh
  Eshift = ERetSh
  CskLdMS = Days5
  CskLDES = Days5E
  TxToCVDs = Days5
  VShift = Days7
  Tx1K2ES = Days5
  CSBCaskS = Days5
  TxCskBS = Days5
End Actions
END INITIALISE

```

CASE 5. THREE 8 HR SHIFTS/DAY, 5 DAYS/WEEK.
WITH LONG REPAIR TIMES ON FUEL RETRIEVAL, MMH, AND HOT CONDITIONING

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week. Fuel retrieval, the MHM, and hot conditioning have long repair times.

B-88

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week. Fuel retrieval, the MHM, and hot conditioning have long repair times.

SNF Project operating 3 shifts, 5 days/week. Cold vacuum drying Hot conditioning operating 7 days/week. Fuel retrieval, the MHM, and hot conditioning have long repair times.

! WITNESS MODEL: SBLONGRP

Base Model - 5 days/wk, 18 hrs/day
Long repair time on Fuel Retrieval,
Material Handling Machine, and Hot
Conditioning

CLOCK

UNIT : Hours;
MULTIPLE : 1,Day,24,0;
MULTIPLE : 2,Week,7,0;
MULTIPLE : 3,,0,0;
RATIO : 1:1;
DISPLAY : USER;
END CLOCK

DETAIL

OPTIONS

BREAKDOWN MODEL: Mean;
PRN Stream : 1;
REPAIR MODEL: Actual;
LABOR TO UNLOAD : No;
WARMUP PERIOD : 0.00;
OUTPUT INTERVAL : None;
UNBLOCK BASIS : Priority;
MONITOR STEP : Undefined;
MIXTURE STEP : Undefined;
MODULE ELEMENT NAMES : Use local preferences;
END OPTIONS

SELECT

CskLoadM

NAME OF MACHINE: CskLoadM;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);

BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add

CHANGE ALL to mco_cask
countmco (1) = countmco (1) + 1
IF countmco (1) = 200
DESC = "LstM"
Done (3) = TIME
ENDIF

End Actions
INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(1)#(1),
CaskBuf#(1);
OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLdM,0,0;

END CskLoadM

Vacuum

NAME OF MACHINE: Vacuum;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (74,84,113,N + 6);
BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 40.0;
* Repair time: 40.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add

Inote that its the first time through
PEN = 1

VacOps (1) = NOPS (Vacuum(1))
VacOps (2) = NOPS (Vacuum(2))
VacOps (3) = NOPS (Vacuum(3))
VacOps (4) = NOPS (Vacuum(4))
VacOps (5) = NOPS (Vacuum(5))
VacOps (6) = NOPS (Vacuum(6))
IF DESC = "LstM" OR DESC = "LstE"
LastMCO (1) = LastMCO (1) + 1
Done (6) = TIME
ENDIF

End Actions
INPUT RULE: Wait;
OUTPUT RULE: IF ISTATE (CSBCask) = 1
PUSH to Tx1KTo2E
ELSE
Wait
ENDIF;
REPORTING: Individual;

SHIFT: VDSHIFT,0,0;

END Vacuum

MCO

NAME OF PART: MCO;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: END
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END MCO

FuelBasQ

NAME OF HISTOGRAM: FuelBasQ;
QUANTITY: 1;
STATS RESET: Yes;

END FuelBasQ

BasinBuf

NAME OF BUFFER: BasinBuf;
QUANTITY: 2;
CAPACITY: 2;
DELAY MODE: None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add
I RECORD NPARTS (BasinBuf(2)) in FuelBasQ
Itotobs = INHUM (FuelBasQ)
Icellone = INCELL (FuelBasQ,1)
Ionepc = cellone / totobs
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END BasinBuf

FuelRetW

NAME OF MACHINE: FuelRetW;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END

CYCLE TIME: TRIANGLE (36,37,50,M);
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Available time;

* Down interval: 100.0;
* Repair time: 23.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Start

Add

Supply (1) = Supply (1) - 1

End Actions

ACTIONS, Finish

Add

IF Supply (1) = 0

Done (1) = TIME

ENDIF

End Actions

INPUT RULE: IF Supply (1) > 0

PULL from MCO out of WORLD

ELSE

Wait

ENDIF;

OUTPUT RULE: PUSH to BasinBuf(1);

REPORTING: Individual;

SHIFT: Wshift,0,0;

END FuelRetW

basbufpc

NAME OF VARIABLE: basbufpc;

QUANTITY: 1;

REPORTING: Yes;

END basbufpc

Tx1Kto2E

NAME OF MACHINE: Tx1Kto2E;

QUANTITY: 1;

TYPE: Single;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (0.5,1,4,13);

BREAKDOWN DETAIL

Breakdown number: 1

* Mode: Available time;

* Down interval: 150.0;

* Repair time: 3.0;

* Scrap part: No;

* Description: Breakdown Number 1

* Setup on repair: No;

* Check at cycle start only: Yes;

LABOR:

Repair: None;

END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 IF DESC = "LstW" OR DESC = "LstE"
 LastMCO (2) = LastMCO (2) + 1
 Done (7) = TIME
 ENDIF
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to CSBCask;
 REPORTING: Individual;
 SHIFT: Tx1K2ES,0,0;

 END Tx1Kto2E

 MHMTx

 NAME OF MACHINE: MHMTx;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (3,3.25,4,15);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 500.0;
 * Repair time: 15.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 IF PEN = 3
 Complete = Complete + 1
 IF WHIP (MCO) = 1 fail MCO's are complete
 STOP
 ENDIF
 ENDIF
 End Actions
 INPUT RULE: IF ISTATE (HotCond(1)) = 0
 Wait
 ELSE
 IF NPARTS (HotCond) > 5
 PULL from HotCond
 ELSE
 PULL from CSB
 ENDIF
 ENDIF;
 OUTPUT RULE: SELECT on PEN CSB,HotCond,SHIP;
 REPORTING: Individual;
 SHIFT: Days5,0,0;

END MHMTx

 FuelRetE

 NAME OF MACHINE: FuelRetE;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (36,37,50,N);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 100.0;
 * Repair time: 23.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Start
 Add
 Supply (2) = Supply (2) - 1
 End Actions
 ACTIONS, Finish
 Add
 IF Supply (2) = 0
 Done (2) = TIME
 ENDIF
 End Actions
 INPUT RULE: IF Supply (2) > 0
 PULL from MCO out of WORLD
 ELSE
 Wait
 ENDIF;
 OUTPUT RULE: PUSH to BasinBuf(2);
 REPORTING: Individual;
 SHIFT: Eshift,0,0;

 END FuelRetE

 CSBCask

 NAME OF MACHINE: CSBCask;
 QUANTITY: 1;
 TYPE: Production;
 * Part type: ExpCask;
 * Production qty: 1;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None

END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: TRIANGLE (10.4,11.4,13.4,14);
BREAKDOWN_DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 300.0;
* Repair time: 6.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
CHANGE mco_cask to MCO
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (3) = LastMCO (3) + 1
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH EmpCask to TxToCskB,MCO to MHMTx;
REPORTING: Individual;
SHIFT: CSBCaskS,0,0;
END CSBCask
HotCond
NAME OF MACHINE: HotCond;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: HC_CTime;
BREAKDOWN_DETAIL
Breakdown number: 1
* Mode: Busy time;
* Down interval: 240.0;
* Repair time: 120.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Start
Add
x = RANDOM (98)
IF x < 0.8
HC_CTime = 140

ELSE
HC_CTime = 205
ENDIF
End Actions
ACTIONS, Finish
Add
PEN = 3
HCNOps (1) = NOPS (HotCond(1))
HCNOps (2) = NOPS (HotCond(2))
HCNOps (3) = NOPS (HotCond(3))
HCNOps (4) = NOPS (HotCond(4))
HCNOps (5) = NOPS (HotCond(5))
HCNOps (6) = NOPS (HotCond(6))
IF DESC = "LstW" OR DESC = "LstE"
Done (8) = TIME
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to MHMTx;
REPORTING: Individual;
SHIFT: DelayHC,0,0;
END HotCond
Days5E
NAME OF SHIFT: Days5E;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 2184.000000;
SHIFT DATA: SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
REPORTING: Yes;
END Days5E
onepc
NAME OF VARIABLE: onepc;
QUANTITY: 1;
REPORTING: Yes;
END onepc
totobs
NAME OF VARIABLE: totobs;
QUANTITY: 1;
REPORTING: Yes;
END totobs
CSB
NAME OF BUFFER: CSB;
QUANTITY: 1;
CAPACITY: 1000;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;

```

ACTIONS, In
Add
!make it its second pass
PEN = 2
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END CSB

cellone

NAME OF VARIABLE: cellone;
QUANTITY: 1;
REPORTING: Yes;

END cellone

CskLoadE

NAME OF MACHINE: CskLoadE;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 35.0;
  * Repair time: 7.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
  LABOR:
    Repair: None;
  END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
CHANGE ALL to mco_cask
countmco (2) = countmco (2) + 1
IF countmco (2) = 200
  Done (4) = TIME
  DESC = "LstE"
ENDIF
End Actions
INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(2)#(1),
  CaskBuf#(1);
OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLdES,0,0;

END CskLoadE

Days5

```

```

NAME OF SHIFT: Days5;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
ACTIONS, End
Add
IF Done (3) > 1 AND ISTATE (CskLoadW) <> 3
  CskLdWS = Woff
ENDIF
IF Done (4) > 1 AND ISTATE (CskLoadE) <> 3
  CskLdES = Eoff
ENDIF
IF countmco (1) = 200 AND countmco (2) = 200
  TxToCVD = Eoff
ENDIF
IF LastMCO (1) = 2 AND ISTATE (Vacuum(1)) <> 3
  VDShift = Eoff
ENDIF
IF LastMCO (2) = 2 AND ISTATE (Tx1KTo2E) <> 3
  Tx1K2ES = Eoff
ENDIF
IF LastMCO (3) = 2 AND ISTATE (CSBCask) <> 3
  CSBCaskS = Eoff
ENDIF
IF LastMCO (4) = 2 AND ISTATE (TxToCskB) <> 3
  TxCskBS = Eoff
ENDIF
End Actions
SHIFT DATA: SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5Me;
REPORTING: Yes;

END Days5

Complete

NAME OF VARIABLE: Complete;
QUANTITY: 1;
REPORTING: Yes;

END Complete

Supply

NAME OF VARIABLE: Supply;
QUANTITY: 2;
REPORTING: Yes;

END Supply

TxToCVD

NAME OF MACHINE: TxToCVD;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :

```

[illegible]

```

END
FILL: None
DISCRETE LINKS:
Empty: None
END
TRIANGLE TIME: 0.1,0.25,0.5,13;
BREAKDOWN DETAIL
Breakdown number: 1
Mode: Available time:
Down interval: 150.0;
Repair time: 10;
Scrap part: 10;
Description: Breakdown Number 1
* Setup on repair: No
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
BREAKDOWN DETAIL
ACTIONS, Finish
Add
If counttime (1) = 200 AND counttime (2) = 200
End Actions
End IF
INPUT RULE: Wait;
OUTPUT RULE: Push to Vacuum;
REPORTING: Individual;
SHIFT: T1C1CVD,0,0;
END T1C1CVD
DelayMC
NAME OF Shift: DelayMC;
TYPE OF Shift: main;
offsets:
Working time: 0.000000;
Rest time: 6552.000000;
SHIFT DATA: 166.000000,0.000000,0.000000,0.000000;
REPORTING: Yes;
END DelayMC
Done
NAME OF VARIABLE: Done;
REPORTING: Yes;
END Done
VdryUse
NAME OF HISTOGRAM: VdryUse;
QUANTITY: 1;
STATUS RESET: Yes;
END VdryUse
CaskBout
NAME OF BUFFER: CaskBout;
CAPACITY: 100;
DELAY MODE: None;

```

B-96

BREAKDOWN_DETAIL

Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 3.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Finish

Add

LastMCO (4) = LastMCO (3)

End Actions

INPUT RULE: Wait;

OUTPUT RULE: PUSH to CaskBuf;

REPORTING: Individual;

SHIFT: TxCskBS,0,0;

END TxToCskB

CaskTot

NAME OF VARIABLE: CaskTot;

QUANTITY: 1;

REPORTING: Yes;

END CaskTot

No_CaskW

NAME OF VARIABLE: No_CaskW;

QUANTITY: 1;

REPORTING: Yes;

END No_CaskW

No_CaskE

NAME OF VARIABLE: No_CaskE;

QUANTITY: 1;

REPORTING: Yes;

END No_CaskE

HC_Ctime

NAME OF VARIABLE: HC_Ctime;

QUANTITY: 1;

REPORTING: Yes;

END HC_Ctime

x

NAME OF VARIABLE: x;

QUANTITY: 1;

REPORTING: Yes;

END x

CaskBufQ

NAME OF HISTOGRAM: CaskBufQ;

QUANTITY: 1;

STATS RESET : Yes;

END CaskBufQ

FRWest

NAME OF LABOR: FRWest;

QUANTITY no shift: 1;

REPORTING: Yes;

END FRWest

countmco

NAME OF VARIABLE: countmco;

QUANTITY: 4;

REPORTING: Yes;

END countmco

VacNOps

NAME OF VARIABLE: VacNOps;

QUANTITY: 6;

REPORTING: Yes;

END VacNOps

SD5_1day

NAME OF SHIFT: SD5_1day;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: 18.000000,6.000000,0.000000;

REPORTING: Yes;

END SD5_1day

SD5We

NAME OF SHIFT: SD5We;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: 0.000000,48.000000,0.000000;

REPORTING: Yes;

END SD5We

HCNOps

NAME OF VARIABLE: HCNOps;

QUANTITY: 6;

REPORTING: Yes;

END HCNOps

WRU1_Day

NAME OF SHIFT: WRU1_Day;

TYPE OF SHIFT: sub shift;

B-97

OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 2.000000,22.000000,0.000000;
REPORTING: Yes;

END WRU1_Day

WRU2_Day

NAME OF SHIFT: WRU2_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 5.000000,19.000000,0.000000;
REPORTING: Yes;

END WRU2_Day

WRU3_Day

NAME OF SHIFT: WRU3_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 8.000000,16.000000,0.000000;
REPORTING: Yes;

END WRU3_Day

WRU4_Day

NAME OF SHIFT: WRU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 11.000000,13.000000,0.000000;
REPORTING: Yes;

END WRU4_Day

WRU5_Day

NAME OF SHIFT: WRU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 14.000000,10.000000,0.000000;
REPORTING: Yes;

END WRU5_Day

WRU6_Day

NAME OF SHIFT: WRU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 17.000000,7.000000,0.000000;
REPORTING: Yes;

END WRU6_Day

WRU7_Day

NAME OF SHIFT: WRU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END WRU7_Day

ERU4_Day

NAME OF SHIFT: ERU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 3.000000,21.000000,0.000000;
REPORTING: Yes;

END ERU4_Day

ERU5_Day

NAME OF SHIFT: ERU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 9.000000,15.000000,0.000000;
REPORTING: Yes;

END ERU5_Day

ERU6_Day

NAME OF SHIFT: ERU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 15.000000,9.000000,0.000000;
REPORTING: Yes;

END ERU6_Day

ERU7_Day

NAME OF SHIFT: ERU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END ERU7_Day

ERU4_Mon

NAME OF SHIFT: ERU4_Mon;
TYPE OF SHIFT: sub shift;

B-98

B-99

```

OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
SD5We
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
SD5We
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
SD5We
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
ERU4_Day
SD5We
ERU4_Day
ERU4_Day;
REPORTING: Yes;

END ERU4_Mon

ERU5_Mon

NAME OF SHIFT: ERU5_Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
SD5We
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
SD5We
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
SD5We
ERU5_Day
ERU5_Day;

```

```

REPORTING: Yes;

END ERU5_Mon

ERU6_Mon

NAME OF SHIFT: ERU6_Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
SD5We
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
SD5We
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
ERU6_Day
SD5We
ERU6_Day
ERU6_Day;
REPORTING: Yes;

END ERU6_Mon

ERU7_Mon

NAME OF SHIFT: ERU7_Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU7_Day
ERU7_Day
ERU7_Day
ERU7_Day
SD5We;
REPORTING: Yes;

END ERU7_Mon

WRU1_Mon

NAME OF SHIFT: WRU1_Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;

```

SHIFT DATA: WRU1_Day

WRU1_Day
WRU1_Day
WRU1_Day
SD5We

WRU1_Day
WRU1_Day
WRU1_Day
WRU1_Day
WRU1_Day
SD5We

WRU1_Day
WRU1_Day
WRU1_Day
WRU1_Day
WRU1_Day
SD5We

WRU1_Day
WRU1_Day
WRU1_Day
SD5We

WRU1_Day

REPORTING: Yes;

END WRU1_Mon

WRU2_Mon

NAME OF SHIFT: WRU2_Mon;

TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU2_Day

WRU2_Day
WRU2_Day
WRU2_Day
SD5We

WRU2_Day
WRU2_Day
WRU2_Day
WRU2_Day
WRU2_Day
SD5We

WRU2_Day
WRU2_Day
WRU2_Day
WRU2_Day
SD5We

WRU2_Day
WRU2_Day
WRU2_Day
WRU1_Day
WRU2_Day
SD5We

WRU2_Day
WRU2_Day;

REPORTING: Yes;

END WRU2_Mon

WRU3_Mon

NAME OF SHIFT: WRU3_Mon;

TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU3_Day

WRU3_Day
WRU3_Day
WRU3_Day
SD5We

WRU3_Day
WRU3_Day
WRU3_Day
WRU3_Day
SD5We

WRU3_Day
WRU3_Day
WRU3_Day
WRU3_Day
SD5We

WRU3_Day
WRU3_Day
WRU3_Day
SD5We

WRU3_Day
WRU3_Day
WRU3_Day;

REPORTING: Yes;

END WRU3_Mon

WRU4_Mon

NAME OF SHIFT: WRU4_Mon;

TYPE OF SHIFT: sub Shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU4_Day

WRU4_Day
WRU4_Day
WRU4_Day
SD5We

WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
SD5We

WRU4_Day
WRU4_Day
WRU4_Day
WRU4_Day
SD5We

WRU4_Day
WRU4_Day

B-100

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WRU4_Day
WRU4_Day
WRU4_Day
SDSW6
WRU4_Day
WRU4_Day;
REPORTING: Yes;

END WRU4_Mon

WRU5_Mon

NAME OF SHIFT: WRU5_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SDSW6
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SDSW6
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SDSW6
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
SDSW6
WRU5_Day;
REPORTING: Yes;

END WRU5_Mon

WRU6_Mon

NAME OF SHIFT: WRU6_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SDSW6
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SDSW6
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SDSW6

```

```

WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SDSW6
WRU6_Day
WRU6_Day
WRU6_Day
WRU6_Day
SDSW6
WRU6_Day
WRU6_Day
WRU6_Day;
REPORTING: Yes;

END WRU6_Mon

WRU7_Mon

NAME OF SHIFT: WRU7_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: WRU7_Day
WRU7_Day
WRU7_Day
WRU7_Day
WRU7_Day
SDSW6;
REPORTING: Yes;

END WRU7_Mon

WRetSh

NAME OF SHIFT: WRetSh;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
ACTIONS, End
Add
  IF TIME > 4368
    Wshift = WshRep
    IF Done (1) > 1
      Wshift = Woff
    ENDIF
  ENDIF
End Actions
SHIFT DATA: WRU1_Mon
WRU2_Mon
WRU3_Mon
WRU4_Mon
WRU5_Mon
WRU6_Mon;
REPORTING: Yes;

END WRetSh

ERetSh

NAME OF SHIFT: ERetSh;
TYPE OF SHIFT: main;

```


OFFSET:
Working time: 0.000000;
Rest time: 2184.000000;
ACTIONS, End

Add

IF TIME > 4368
EShift = EShRep
IF Done (2) > 1
EShift = Eoff
ENDIF

ENDIF
End Actions
SHIFT DATA: ERU4_Mon
ERU5_Mon
ERU6_Mon;
REPORTING: Yes;

END ERetSh

Wshift

NAME OF VARIABLE: Wshift;
QUANTITY: 1;
REPORTING: Yes;

END Wshift

WShRep

NAME OF SHIFT: WShRep;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU7_Mon;
REPORTING: Yes;

END WShRep

EshRep

NAME OF SHIFT: EshRep;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU7_Mon;
REPORTING: Yes;

END EshRep

Eshift

NAME OF VARIABLE: Eshift;
QUANTITY: 1;
REPORTING: Yes;

END Eshift

Eoff

NAME OF SHIFT: Eoff;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: 0.000000,168.000000,0.000000;
REPORTING: Yes;

END Eoff

Woff

NAME OF SHIFT: Woff;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 0.000000,168.000000,0.000000;
REPORTING: Yes;

END Woff

Days7

NAME OF SHIFT: Days7;
TYPE OF SHIFT: main;

OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 168.000000,0.000000,0.000000;
REPORTING: Yes;

END Days7

VDShift

NAME OF VARIABLE: VDShift;
QUANTITY: 1;
REPORTING: Yes;

END VDShift

CskLdWS

NAME OF VARIABLE: CskLdWS;
QUANTITY: 1;
REPORTING: Yes;

END CskLdWS

CskLdES

NAME OF VARIABLE: CskLdES;
QUANTITY: 1;
REPORTING: Yes;

END CskLdES

TxToCVDS

NAME OF VARIABLE: TxToCVDS;
QUANTITY: 1;
REPORTING: Yes;

END TxToCVDS

Tx1KZES

NAME OF VARIABLE: Tx1KZES;
QUANTITY: 1;
REPORTING: Yes;

```
END Tx1K2ES

CSBCaskS

NAME OF VARIABLE: CSBCaskS;
QUANTITY: 1;
REPORTING: Yes;

END CSBCaskS

TxCskBS

NAME OF VARIABLE: TxCskBS;
QUANTITY: 1;
REPORTING: Yes;

END TxCskBS

LastMCO

NAME OF VARIABLE: LastMCO;
QUANTITY: 4;
REPORTING: Yes;

END LastMCO

END SELECT

END DETAIL

INITIALISE
Add
*****
|
|      Time Units are in HOURS
|
|*****
IKE Basic
  Supply (1) = 200
IKW Basin
  Supply (2) = 200
  Wshift = WRetSh
  Eshift = ERetSh
  CskLoWS = Days5
  CskLoES = Days5E
  TxToCVDS = Days5
  VDShift = Days7
  Tx1K2ES = Days5
  CSBCaskS = Days5
  TxCskBS = Days5
End Actions
END INITIALISE
```

CASE 6. THREE 8 HR SHIFTS/DAY, 7 DAYS/WEEK.

SNF Project operating 3 shifts, 7 days a week

B-105

SNF Project operating 3 shifts, 7 days a week

SNF Project operating 3 shifts, 7 days a week

B-107

WHC-SD-SNF-RPT-011
Rev. 0

! WITNESS MODEL: SNF7BASE

Base Model - 7 days/wk, 18 hrs/day

CLOCK

UNIT : Hours;
MULTIPLE : 1,Day,24,0;
MULTIPLE : 2,Week,7,0;
MULTIPLE : 3,,0,0;
RATIO : 1:1;
DISPLAY : USER;
END CLOCK

DETAIL

OPTIONS

BREAKDOWN MODEL: Mean;
PRN Stream : 1;
REPAIR MODEL: Actual;
LABOR TO UNLOAD : No;
WARMUP PERIOD : 0.00;
OUTPUT INTERVAL : None;
UNBLOCK BASIS : Priority;
MONITOR STEP : Undefined;
MIXTURE STEP : Undefined;
MODULE ELEMENT NAMES : Use local preferences;
END OPTIONS

SELECT

CskLoadW

NAME OF MACHINE: CskLoadW;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);
BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END

END BREAKDOWN DETAIL

ACTIONS, Finish
Add

CHANGE ALL to mco_cask
countmco (1) = countmco (1) + 1
IF countmco (1) = 200
DESC = "LstW"

Done (3) = TIME
ENDIF
End Actions
INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(1)#(1),
CskBuf#(1);
OUTPUT RULE: PUSH to Tx1KTo2E;
REPORTING: Individual;
SHIFT: CskLdWS,0,0;
END CskLoadW

Vacuum

NAME OF MACHINE: Vacuum;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END

CYCLE TIME: TRIANGLE (74,84,113,N + 6);
BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 40.0;
* Repair time: 40.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

Inote that its the first time through

PEN = 1
VacNops (1) = NOPS (Vacuum(1))
VacNops (2) = NOPS (Vacuum(2))
VacNops (3) = NOPS (Vacuum(3))
VacNops (4) = NOPS (Vacuum(4))
VacNops (5) = NOPS (Vacuum(5))
VacNops (6) = NOPS (Vacuum(6))
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (1) = LastMCO (1) + 1
Done (6) = TIME
ENDIF

End Actions

INPUT RULE: Wait;
OUTPUT RULE: IF ISTATE (CSBCask) = 1
PUSH to Tx1KTo2E
ELSE
Wait
ENDIF;
REPORTING: Individual;
SHIFT: VDShift,0,0;

END Vacuum

MCO

NAME OF PART: MCO;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: END
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END MCO

FuelBasQ

NAME OF HISTOGRAM: FuelBasQ;
QUANTITY: 1;
STATS RESET: Yes;

END FuelBasQ

BasinBuf

NAME OF BUFFER: BasinBuf;
QUANTITY: 2;
CAPACITY: 2;
DELAY MODE: None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
• Select: First;
ACTIONS, In
Add

IRECORD NPARTS (BasinBuf(2)) in FuelBasQ

Itotobs = INNUM (FuelBasQ)
Icellone = INCELL (FuelBasQ,1)
Ionepc = cellone / totobs
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END BasinBuf

FuelRetW

NAME OF MACHINE: FuelRetW;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:

Cycle: None;

END

DISCRETE LINKS :
Fill: None

END

DISCRETE LINKS :
Empty: None

END

CYCLE TIME: TRIANGLE (36,37,50,N);

BREAKDOWN_DETAIL

Breakdown number: 1
• Mode: Available time;
• Down interval: 35.0;
• Repair time: 17.0;
• Scrap part: No;
• Description: Breakdown Number 1

• Setup on repair: No;
• Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Start

Add

Supply (1) = Supply (1) - 1

End Actions

ACTIONS, Finish

Add

IF Supply (1) = 0

Done (1) = TIME

ENDIF

End Actions

INPUT RULE: IF Supply (1) > 0
PULL from MCO out of WORLD

ELSE

Wait

ENDIF;

OUTPUT RULE: PUSH to BasinBuf(1);

REPORTING: Individual;

SHIFT: Wshift,0,0;

END FuelRetW

basbufpc

NAME OF VARIABLE: basbufpc;

QUANTITY: 1;

REPORTING: Yes;

END basbufpc

Tx1Kto2E

NAME OF MACHINE: Tx1Kto2E;

QUANTITY: 1;

TYPE: Single;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :
Fill: None

END

DISCRETE LINKS :
Empty: None

END

CYCLE TIME: TRIANGLE (0.5,1,4,13);

BREAKDOWN_DETAIL

Breakdown number: 1

• Mode: Available time;

• Down interval: 150.0;

• Repair time: 3.0;

• Scrap part: No;

• Description: Breakdown Number 1

• Setup on repair: No;

• Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Finish

Add

IF DESC = "LatW" OR DESC = "LstE"
 LastMCO (2) = LastMCO (2) + 1
 Done (7) = TIME
 ENDIF

End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to CSBCask;
 REPORTING: Individual;
 SHIFT: Tx1K2ES,0,0;

END Tx1KTo2E

MHMTx

NAME OF MACHINE: MHMTx;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;

END
 DISCRETE LINKS :
 Fill: None

END
 DISCRETE LINKS :
 Empty: None

END
 CYCLE TIME: TRIANGLE (3,3,25,4,15);
 BREAKDOWN DETAIL

Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 6.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;

LABOR:
 Repair: None;

END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add

IF PEN = 3
 Complete = Complete + 1
 IF MWIP (MCO) = 1 all MCO's are complete

STOP
 ENDIF

End Actions
 INPUT RULE: IF ISTATE (HotCond(1)) = 0

Wait
 ELSE
 IF MPARTS (HotCond) > 5
 PULL from HotCond
 ELSE
 PULL from CSB
 ENDIF
 ENDIF;

OUTPUT RULE: SELECT on PEN CSB,HotCond,SHIP;
 REPORTING: Individual;
 SHIFT: Days5,0,0;

END MHMTx

FuelRetE

NAME OF MACHINE: FuelRetE;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:

Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None

END
 DISCRETE LINKS :
 Empty: None

END
 CYCLE TIME: TRIANGLE (36,37,50,N);
 BREAKDOWN DETAIL

Breakdown number: 1
 * Mode: Available time;
 * Down interval: 35.0;
 * Repair time: 17.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;

LABOR:
 Repair: None;

END
 END BREAKDOWN DETAIL
 ACTIONS, Start
 Add

Supply (2) = Supply (2) - 1

End Actions
 ACTIONS, Finish
 Add

IF Supply (2) = 0
 Done (2) = TIME
 ENDIF

End Actions
 INPUT RULE: IF Supply (2) > 0
 PULL from MCO out of WORLD

ELSE
 Wait
 ENDIF;

OUTPUT RULE: PUSH to BasinBuf(2);
 REPORTING: Individual;
 SHIFT: Eshift,0,0;

END FuelRetE

CSBCask

NAME OF MACHINE: CSBCask;
 QUANTITY: 1;
 TYPE: Production;
 * Part type: EmpCask;
 * Production qty: 1;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;

END
 DISCRETE LINKS :
 Fill: None

END
 DISCRETE LINKS :
 Empty: None

END

MHC-SD-SNF-RPT-011
 Rev. 0

CYCLE TIME: TRIANGLE (10.4,11.4,13.4,14);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 300.0;
 * Repair time: 6.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 CHANGE mco cask to MCO
 IF DESC = "LstW" OR DESC = "LstE"
 LastMCO (3) = LastMCO (3) + 1
 ENDIF
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH EmpCask to TxToCskB, MCO to MHMTX;
 REPORTING: Individual;
 SHIFT: CSBCaskS,0,0;
 END CSBCask
 HotCond
 NAME OF MACHINE: HotCond;
 QUANTITY: 6;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: HC CTime;
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Busy time;
 * Down interval: 40.0;
 * Repair time: 60.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Start
 Add
 x = RANDOM (98)
 IF x < 0.8
 HC CTime = 140
 ELSE
 HC CTime = 205
 ENDIF
 End Actions

ACTIONS, Finish
 Add
 PEN = 3
 HCNops (1) = NOPS (HotCond(1))
 HCNops (2) = NOPS (HotCond(2))
 HCNops (3) = NOPS (HotCond(3))
 HCNops (4) = NOPS (HotCond(4))
 HCNops (5) = NOPS (HotCond(5))
 HCNops (6) = NOPS (HotCond(6))
 IF DESC = "LstW" OR DESC = "LstE"
 Done (8) = TIME
 ENDIF
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to MHMTX;
 REPORTING: Individual;
 SHIFT: DelayHC,0,0;
 END HotCond
 Days5E
 NAME OF SHIFT: Days5E;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 2184.000000;
 SHIFT DATA: SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 REPORTING: Yes;
 END Days5E
 onepc
 NAME OF VARIABLE: onepc;
 QUANTITY: 1;
 REPORTING: Yes;
 END onepc
 totobs
 NAME OF VARIABLE: totobs;
 QUANTITY: 1;
 REPORTING: Yes;
 END totobs
 CSB
 NAME OF BUFFER: CSB;
 QUANTITY: 1;
 CAPACITY: 1000;
 DELAY MODE : None;
 INPUT POSITION: Rear;
 OUTPUT SCAN FROM: Front;
 * Select: First;
 ACTIONS, In
 Add
 make it its second pass
 PEN = 2

End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END CSB

cellone

NAME OF VARIABLE: cellone;
QUANTITY: 1;
REPORTING: Yes;

END cellone

CskLoadE

NAME OF MACHINE: CskLoadE;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END

DISCRETE LINKS :
Fill: None

END

DISCRETE LINKS :
Empty: None

END

CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

CHANGE ALL to mco_cask
countmco (2) = countmco (2) + 1
IF countmco (2) = 200
Done (4) = TIME
DESC = "Lste"

ENDIF

End Actions

INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(2)#(1),
CaskBuf#(1);

OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLdES,0,0;

END CskLoadE

Days5

NAME OF SHIFT: Days5;
TYPE OF SHIFT: main;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

ACTIONS, End

Add

IF Done (3) > 1 AND ISTATE (CskLoadW) <> 3
CskLdWS = Woff

ENDIF

IF Done (4) > 1 AND ISTATE (CskLoadE) <> 3
CskLdES = Eoff

ENDIF

IF countmco (1) = 200 AND countmco (2) = 200
TxToCVDs = Eoff

ENDIF

IF LastMCO (1) = 2 AND ISTATE (Vacuum(1)) <> 3
VDSHift = Eoff

ENDIF

IF LastMCO (2) = 2 AND ISTATE (Tx1KToZE) <> 3
Tx1K2ES = Eoff

ENDIF

IF LastMCO (3) = 2 AND ISTATE (CSBCask) <> 3
CSBCaskS = Eoff

ENDIF

IF LastMCO (4) = 2 AND ISTATE (TxToCskB) <> 3
TxCskBS = Eoff

ENDIF

End Actions

SHIFT DATA: SDS_1day
SDS_1day
SDS_1day
SDS_1day
SDS_1day
SDSWe;

REPORTING: Yes;

END Days5

Complete

NAME OF VARIABLE: Complete;
QUANTITY: 1;
REPORTING: Yes;

END Complete

Supply

NAME OF VARIABLE: Supply;
QUANTITY: 2;
REPORTING: Yes;

END Supply

TxToCVD

NAME OF MACHINE: TxToCVD;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END

DISCRETE LINKS :
Fill: None

END

DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (0.1,0.25,0.5,13);
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 150.0;
* Repair time: 0.5;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add
IF countmco (1) = 200 AND countmco (2) = 200
Done (5) = TIME
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to Vacuum;
REPORTING: Individual;
SHIFT: TxToCvds,0,0;
END TxToCvD
DelayHC
NAME OF SHIFT: DelayHC;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 6552.000000;
SHIFT DATA: 168.000000,0.000000,0.000000;
REPORTING: Yes;
END DelayHC
Done
NAME OF VARIABLE: Done;
QUANTITY: 8;
REPORTING: Yes;
END Done
VDryUse
NAME OF HISTOGRAM: VDryUse;
QUANTITY: 1;
STATS RESET : Yes;
END VDryUse
CaskBuf
NAME OF BUFFER: CaskBuf;
QUANTITY: 1;
CAPACITY: 100;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In

Add
I RECORD NPARTS (CaskBuf) in CaskBufQ
!totobs = INHWM (CaskBufQ)
!cellone = INCELL (CaskBufQ,1)
!onepc = cellone / totobs
End Actions
ACTIONS, Out
Add
RECORD 9 - NPARTS (CaskBuf) in CaskBufQ
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;
END CaskBuf
EmpCask
NAME OF PART: EmpCask;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 9;
INTER ARRIVAL TIME: Undefined;
FIRST ARRIVAL AT: 0.0;
LOT SIZE: 9;
OUTPUT RULE: PUSH to CaskBuf;
PART ROUTE: None
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;
END EmpCask
mco_cask
NAME OF PART: mco_cask;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: None
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;
END mco_cask
TxToCskB
NAME OF MACHINE: TxToCskB;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: TRIANGLE (0.5,1,4,13);
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 150.0;

```

* Repair time: 3.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add
  LastMCO (4) = LastMCO (3)
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to CaskBuf;
REPORTING: Individual;
SHIFT: TxCskBS,0,0;

END TxToCskB

CaskTot

NAME OF VARIABLE: CaskTot;
QUANTITY: 1;
REPORTING: Yes;

END CaskTot

No_CaskW

NAME OF VARIABLE: No_CaskW;
QUANTITY: 1;
REPORTING: Yes;

END No_CaskW

No_CaskE

NAME OF VARIABLE: No_CaskE;
QUANTITY: 1;
REPORTING: Yes;

END No_CaskE

HC_CTime

NAME OF VARIABLE: HC_CTime;
QUANTITY: 1;
REPORTING: Yes;

END HC_CTime

x

NAME OF VARIABLE: x;
QUANTITY: 1;
REPORTING: Yes;

END x

CaskBufQ

NAME OF HISTOGRAM: CaskBufQ;
QUANTITY: 1;
STATS RESET : Yes;

```

```

END CaskBufQ

FRWest

NAME OF LABOR: FRWest;
QUANTITY no shift: 1;
REPORTING: Yes;

END FRWest

countmco

NAME OF VARIABLE: countmco;
QUANTITY: 4;
REPORTING: Yes;

END countmco

VacNOps

NAME OF VARIABLE: VacNOps;
QUANTITY: 6;
REPORTING: Yes;

END VacNOps

SD5_1day

NAME OF SHIFT: SD5_1day;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END SD5_1day

SD5We

NAME OF SHIFT: SD5We;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: SD5_1day
SD5_1day;
REPORTING: Yes;

END SD5We

HCNOps

NAME OF VARIABLE: HCNOps;
QUANTITY: 6;
REPORTING: Yes;

END HCNOps

WRU1_Day

NAME OF SHIFT: WRU1_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;

```

SHIFT DATA: 2.000000,22.000000,0.000000;
REPORTING: Yes;

END WRU1_Day

WRU2_Day

NAME OF SHIFT: WRU2_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 5.000000,19.000000,0.000000;
REPORTING: Yes;

END WRU2_Day

WRU3_Day

NAME OF SHIFT: WRU3_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 8.000000,16.000000,0.000000;
REPORTING: Yes;

END WRU3_Day

WRU4_Day

NAME OF SHIFT: WRU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 11.000000,13.000000,0.000000;
REPORTING: Yes;

END WRU4_Day

WRU5_Day

NAME OF SHIFT: WRU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 14.000000,10.000000,0.000000;
REPORTING: Yes;

END WRU5_Day

WRU6_Day

NAME OF SHIFT: WRU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 17.000000,7.000000,0.000000;
REPORTING: Yes;

END WRU6_Day

WRU7_Day

NAME OF SHIFT: WRU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END WRU7_Day

ERU4_Day

NAME OF SHIFT: ERU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 3.000000,21.000000,0.000000;
REPORTING: Yes;

END ERU4_Day

ERU5_Day

NAME OF SHIFT: ERU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 9.000000,15.000000,0.000000;
REPORTING: Yes;

END ERU5_Day

ERU6_Day

NAME OF SHIFT: ERU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 15.000000,9.000000,0.000000;
REPORTING: Yes;

END ERU6_Day

ERU7_Day

NAME OF SHIFT: ERU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END ERU7_Day

ERU4_Mon

NAME OF SHIFT: ERU4_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;

B-116

REPORTING: Yes:

ERU5 Mon

SHIFT DATA: ERU5 Day

ERUS Day

ERU5-Day

END ERU5 Mon

NAME OF SHIFT: ERU6 Mon;
TYPE OF SHIFT: sub shift:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: ERU6_Day

REPORTING: Yes:

ERU7 Mon

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: ERU7_Day

SD5We;
REPORTING: Yes:

1574511

B-118

REPORTING: Yes:

WRU5 Mon

SHIFT DATA: WRU5 Day

WRU5-Day

REPORTING: Yes:

WRU6 Mon

SHIFT DATA: WRU6 Day

WRU6_Day

WRU6_Day

WRU6_Day
WRU6_NightWRU6_Day
WRU6_NightWRUG-Day
WRUG-Day

WRU6_Day

WRU6 Day

WRU6_Day
WRU6_NightWR06_Day
WR16_Day

WRU6-Day

WRU6_Day

WRU6 Day

WRU6_Day
WRU6_NightWRU6_Day
WRU6_Night

WRU6-Day

WRU6_Day

WRU6 Day

WRU6_Day
WRU4_DayWRU6_Day
WRU6_Night

WRU6-Day

WRU6_Day

WRU6 Day

WRU6_Day
WRU6_NightWRU6_Day
WRU6_Night

REPORTING: Yes;

END WRU6 Mon

VRU7 Mon

SHIFT DATA: WBU7 Day

WRU7_Day

WRU7 Day

WRU7 Day
WRU7 Day

WRU/Day
SD54e:

REPORTING: Yes:

END WRU7_Mon

WRetSh

NAME OF SHIFT: WRetSh;

TYPE OF SHIFT: main;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

ACTIONS, End

Add

IF TIME > 4368

Wshift = WShRep

IF Done (1) > 1

Wshift = Woff

ENDIF

ENDIF

End Actions

SHIFT DATA: WRU1_Mon

WRU2_Mon

WRU3_Mon

WRU4_Mon

WRU5_Mon

WRU6_Mon;

REPORTING: Yes;

END WRetSh

ERetSh

NAME OF SHIFT: ERetSh;

TYPE OF SHIFT: main;

OFFSET:

Working time: 0.000000;

Rest time: 2184.000000;

ACTIONS, End

Add

IF TIME > 4368

Eshift = EShRep

IF Done (2) > 1

Eshift = Eoff

ENDIF

ENDIF

End Actions

SHIFT DATA: ERU4_Mon

ERU5_Mon

ERU6_Mon;

REPORTING: Yes;

END ERetSh

Wshift

NAME OF VARIABLE: Wshift;

QUANTITY: 1;

REPORTING: Yes;

END Wshift

WShRep

NAME OF SHIFT: WShRep;

TYPE OF SHIFT: main;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU7_Mon;

REPORTING: Yes;

END WShRep

EShRep

NAME OF SHIFT: EShRep;

TYPE OF SHIFT: main;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: ERU7_Mon;

REPORTING: Yes;

END EShRep

Eshift

NAME OF VARIABLE: Eshift;

QUANTITY: 1;

REPORTING: Yes;

END Eshift

Eoff

NAME OF SHIFT: Eoff;

TYPE OF SHIFT: main;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: 0.000000,168.000000,0.000000;

REPORTING: Yes;

END Eoff

Woff

NAME OF SHIFT: Woff;

TYPE OF SHIFT: main;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: 0.000000,168.000000,0.000000;

REPORTING: Yes;

END Woff

Days7

NAME OF SHIFT: Days7;

TYPE OF SHIFT: main;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: 168.000000,0.000000,0.000000;

REPORTING: Yes;

END Days7

VDshift

NAME OF VARIABLE: VDshift;

QUANTITY: 1;

B-119

```

REPORTING: Yes;

END VDShift

CskLdWS
NAME OF VARIABLE: CskLdWS;
QUANTITY: 1;
REPORTING: Yes;

END CskLdWS

CskLdES
NAME OF VARIABLE: CskLdES;
QUANTITY: 1;
REPORTING: Yes;

END CskLdES

TxToCVDS
NAME OF VARIABLE: TxToCVDS;
QUANTITY: 1;
REPORTING: Yes;

END TxToCVDS

Tx1K2ES
NAME OF VARIABLE: Tx1K2ES;
QUANTITY: 1;
REPORTING: Yes;

END Tx1K2ES

CSBCaskS
NAME OF VARIABLE: CSBCaskS;
QUANTITY: 1;
REPORTING: Yes;

END CSBCaskS

TxCskBS
NAME OF VARIABLE: TxCskBS;
QUANTITY: 1;
REPORTING: Yes;

END TxCskBS

LastMCO
NAME OF VARIABLE: LastMCO;
QUANTITY: 4;
REPORTING: Yes;

END LastMCO

END SELECT

END DETAIL

INITIALISE
Add

```

```

*****
Time Units are in HOURS
*****
!KE Basic
Supply (1) = 200
!KW Basin
Supply (2) = 200
Wshift = WRetSh
EShift = ERetSh
CskLdWS = Days5
CskLdES = Days5E
TxToCVDS = Days5
VDShift = Days7
Tx1K2ES = Days5
CSBCaskS = Days5
TxCskBS = Days5
End Actions
END INITIALISE

```

CASE 7. TWO 12 HR SHIFTS/DAY, 7 DAYS/WEEK.

SNF Project operating 2 twelve hr shifts, 7 days/week.

B-122

WHC-SD-SNF-RPT-011
Rev. 0

SNF Project operating 2 twelve hr shifts, 7 days/week.

B-123

MHC-SD-SNF-RPT-011
Rev. 0

I WITNESS MODEL: SNF720HR

Base Model - 7 days/wk, 20 hrs/day

CLOCK

UNIT : Hours;
MULTIPLE : 1,Day,24,0;
MULTIPLE : 2,Week,7,0;
MULTIPLE : 3,,0,0;
RATIO : 1:1;
DISPLAY : USER;
END CLOCK

DETAIL

OPTIONS

BREAKDOWN MODEL: Mean;
PRN Stream : 1;
REPAIR MODEL: Actual;
LABOR TO UNLOAD : No;
WARMUP PERIOD : 0.00;
OUTPUT INTERVAL : None;
UNBLOCK BASIS : Priority;
MONITOR STEP : Undefined;
MIXTURE STEP : Undefined;
MODULE ELEMENT NAMES : Use local preferences;
END OPTIONS

SELECT

CskLoadW

NAME OF MACHINE: CskLoadW;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);
BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add

CHANGE ALL to mco cask
countmco (1) = countmco (1) + 1
IF countmco (1) = 200
DESC = "LstW"

Done (3) = TIME
ENDIF

End Actions

INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(1)#(1),

CskBuf#(1);
OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLdWS,0,0;

END CskLoadW

Vacuum

NAME OF MACHINE: Vacuum;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (74,84,113,N + 6);
BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 40.0;
* Repair time: 40.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add

Inote that its the first time through

PEN = 1
VacNops (1) = NOPS (Vacuum(1))
VacNops (2) = NOPS (Vacuum(2))
VacNops (3) = NOPS (Vacuum(3))
VacNops (4) = NOPS (Vacuum(4))
VacNops (5) = NOPS (Vacuum(5))
VacNops (6) = NOPS (Vacuum(6))
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (1) = LastMCO (1) + 1
Done (6) = TIME
ENDIF

End Actions

INPUT RULE: Wait;
OUTPUT RULE: IF ISTATE (CSBcask) = 1
PUSH to TxIKTo2E
ELSE
Wait
ENDIF;

REPORTING: Individual;
SHIFT: VdShift,0,0;

END Vacuum

B-125

MHC-SD-SNF-RPT-011
Rev. 0

10/1/2011

MCO

NAME OF PART: MCO;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: END
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END MCO

FuelBasQ

NAME OF HISTOGRAM: FuelBasQ;
QUANTITY: 1;
STATS RESET : Yes;

END FuelBasQ

BasinBuf

NAME OF BUFFER: BasinBuf;
QUANTITY: 2;
CAPACITY: 2;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add

IRECORD NPARTS (BasinBuf(2)) in FuelBasQ
Itotobs = INHNUM (FuelBasQ)
Icellone = IXCELL (FuelBasQ,1)
Ionepc = cellone / totobs

End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END BasinBuf

FuelRetW

NAME OF MACHINE: FuelRetW;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (36,37,50,N);

BREAKDOWN_DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 17.0;
* Scrap part: No;
* Description: Breakdown Number 1

* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN_DETAIL

ACTIONS, Start

Add

Supply (1) = Supply (1) - 1

End Actions

ACTIONS, Finish

Add

IF Supply (1) = 0

Done (1) = TIME

ENDIF

End Actions

INPUT RULE: IF Supply (1) > 0

PULL from MCO out of WORLD

ELSE

Wait

ENDIF;

OUTPUT RULE: PUSH to BasinBuf(1);

REPORTING: Individual;

SHIFT: Wshift,0,0;

END FuelRetW

basbufpc

NAME OF VARIABLE: basbufpc;
QUANTITY: 1;
REPORTING: Yes;

END basbufpc

Tx1Kto2E

NAME OF MACHINE: Tx1Kto2E;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (0.5,1,4,13);

BREAKDOWN_DETAIL

Breakdown number: 1

* Mode: Available time;
* Down interval: 150.0;
* Repair time: 3.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Finish

Add

B-126

IF DESC = "LstW" OR DESC = "LstE"
 LastMCO (2) = LastMCO (2) + 1
 Done (7) = TIME
 ENDIF

End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to CSBCask;
 REPORTING: Individual;
 SHIFT: Tx1K2ES,0,0;

END Tx1KTo2E

MHMTx

NAME OF MACHINE: MHMTx;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;

END
 DISCRETE LINKS :
 Fill: None

END
 DISCRETE LINKS :
 Empty: None

END
 CYCLE TIME: TRIANGLE (3,3.25,4,15);
 BREAKDOWN DETAIL

Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 6.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;

END
 END BREAKDOWN DETAIL
 ACTIONS, Finish

Add
 IF PEN = 3
 Complete = Complete + 1
 IF MWIP (MCO) = 1 all MCO's are complete
 STOP
 ENDIF
 ENDIF

End Actions
 INPUT RULE: IF ISTATE (HotCond(1)) = 0
 Wait
 ELSE
 IF NPARTS (HotCond) > 5
 PULL from HotCond
 ELSE
 PULL from CSB
 ENDIF
 ENDIF;

OUTPUT RULE: SELECT on PEN CSB,HotCond,SHIP;
 REPORTING: Individual;
 SHIFT: Days5,0,0;

END MHMTx

FuelRetE

NAME OF MACHINE: FuelRetE;

QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;

END
 DISCRETE LINKS :
 Fill: None

END
 DISCRETE LINKS :
 Empty: None

END
 CYCLE TIME: TRIANGLE (36,37,50,N);
 BREAKDOWN DETAIL

Breakdown number: 1
 * Mode: Available time;
 * Down interval: 35.0;
 * Repair time: 17.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;

END
 END BREAKDOWN DETAIL
 ACTIONS, Start

Add
 Supply (2) = Supply (2) - 1
 End Actions
 ACTIONS, Finish
 Add

IF Supply (2) = 0
 Done (2) = TIME

ENDIF
 End Actions
 INPUT RULE: IF Supply (2) > 0
 PULL from MCO out of WORLD
 ELSE
 Wait
 ENDIF;

OUTPUT RULE: PUSH to BasinBuf(2);
 REPORTING: Individual;
 SHIFT: EShift,0,0;

END FuelRetE

CSBCask

NAME OF MACHINE: CSBCask;
 QUANTITY: 1;
 TYPE: Production;
 * Part type: EmpCask;
 * Production qty: 1;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;

END
 DISCRETE LINKS :
 Fill: None

END
 DISCRETE LINKS :
 Empty: None

END

MHC-SD-SNF-RPT-011
 Rev. 0

CYCLE TIME: TRIANGLE (10.4,11.4,13.4,14);

BREAKDOWN DETAIL

Breakdown number: 1
 * Mode: Available time;
 * Down interval: 300.0;
 * Repair time: 6.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

CHANGE mco cask to MCO
 IF DESC = "LstW" OR DESC = "LstE"
 LastMCO (3) = LastMCO (3) + 1
 ENDIF

End Actions

INPUT RULE: Wait;
 OUTPUT RULE: PUSH EmpCask to TxToCaskB,MCO to MHMTx;
 REPORTING: Individual;
 SHIFT: CSBCaskS,0,0;

END CSBCask

HotCond

NAME OF MACHINE: HotCond;
 QUANTITY: 6;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: HC CTime;

BREAKDOWN DETAIL

Breakdown number: 1
 * Mode: Busy time;
 * Down interval: 40.0;
 * Repair time: 60.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Start

Add

X = RANDOM (98)
 IF X < 0.8
 HC CTime = 140
 ELSE
 HC CTime = 205
 ENDIF

End Actions

ACTIONS, Finish

Add

PEN = 3
 HCNops (1) = NOPS (HotCond(1))
 HCNops (2) = NOPS (HotCond(2))
 HCNops (3) = NOPS (HotCond(3))
 HCNops (4) = NOPS (HotCond(4))
 HCNops (5) = NOPS (HotCond(5))
 HCNops (6) = NOPS (HotCond(6))
 IF DESC = "LstW" OR DESC = "LstE"
 Done (8) = TIME
 ENDIF

End Actions

INPUT RULE: Wait;
 OUTPUT RULE: PUSH to MHMTx;
 REPORTING: Individual;
 SHIFT: DelayHC,0,0;

END HotCond

Days5E

NAME OF SHIFT: Days5E;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 2184.000000;
 SHIFT DATA: SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5We;

REPORTING: Yes;

END Days5E

onepc

NAME OF VARIABLE: onepc;
 QUANTITY: 1;
 REPORTING: Yes;

END onepc

totobs

NAME OF VARIABLE: totobs;
 QUANTITY: 1;
 REPORTING: Yes;

END totobs

CSB

NAME OF BUFFER: CSB;
 QUANTITY: 1;
 CAPACITY: 1000;
 DELAY MODE : None;
 INPUT POSITION: Rear;
 OUTPUT SCAN FROM: Front;
 * Select: First;
 ACTIONS, In

Add

Make it its second pass
 PEN = 2

End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END CSB

cellone

NAME OF VARIABLE: cellone;
QUANTITY: 1;
REPORTING: Yes;

END cellone

CskLoadE

NAME OF MACHINE: CskLoadE;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);

BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

CHANGE ALL to mco cask
countmco (2) = countmco (2) + 1
IF countmco (2) = 200
Done (4) = TIME
DESC = "Late"
ENDIF

End Actions

INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(2)##(1),
CskBuf#(1);
OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLdES,0,0;

END CskLoadE

Days5

NAME OF SHIFT: Days5;
TYPE OF SHIFT: main;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
ACTIONS, End

Add

IF Done (3) > 1 AND ISTATE (CskLoadW) <> 3
CskLdWS = Woff
ENDIF
IF Done (4) > 1 AND ISTATE (CskLoadE) <> 3
CskLdES = Eoff
ENDIF
IF countmco (1) = 200 AND countmco (2) = 200
TxToCVDs = Eoff
ENDIF
IF LastMCO (1) = 2 AND ISTATE (Vacuum(1)) <> 3
VDSHift = Eoff
ENDIF
IF LastMCO (2) = 2 AND ISTATE (Tx1Kto2E) <> 3
Tx1KZES = Eoff
ENDIF
IF LastMCO (3) = 2 AND ISTATE (CSBCask) <> 3
CSBCaskS = Eoff
ENDIF
IF LastMCO (4) = 2 AND ISTATE (TxToCskB) <> 3
TxCskBS = Eoff
ENDIF

End Actions

SHIFT DATA: SD5_1day

SD5_1day

SD5_1day

SD5_1day

SD5_1day

SD5We;

REPORTING: Yes;

END Days5

Complete

NAME OF VARIABLE: Complete;
QUANTITY: 1;

REPORTING: Yes;

END Complete

Supply

NAME OF VARIABLE: Supply;
QUANTITY: 2;
REPORTING: Yes;

END Supply

TxToCVD

NAME OF MACHINE: TxToCVD;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

```

END
CYCLE TIME: TRIANGLE (0.1,0.25,0.5,13);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 150.0;
  * Repair time: 0.5;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
  LABOR:
    Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
  IF countmco (1) = 200 AND countmco (2) = 200
    Done (5) = TIME
  ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to Vacuum;
REPORTING: Individual;
SHIFT: TxToCvds,0,0;

END TxToCvD

DelayHC

NAME OF SHIFT: DelayHC;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 6552.000000;
SHIFT DATA: 168.000000,0.000000,0.000000;
REPORTING: Yes;

END DelayHC

Done

NAME OF VARIABLE: Done;
QUANTITY: 8;
REPORTING: Yes;

END Done

VDryUse

NAME OF HISTOGRAM: VDryUse;
QUANTITY: 1;
STATS RESET : Yes;

END VDryUse

CaskBuf

NAME OF BUFFER: CaskBuf;
QUANTITY: 1;
CAPACITY: 100;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In

```

```

Add
!RECORD NPARTS (CaskBuf) in CaskBufQ
!totobs = !HNUM (CaskBufQ)
!cellone = !HCELL (CaskBufQ,1)
!onepc = cellone / totobs
End Actions
ACTIONS, Out
Add
  RECORD 9 - NPARTS (CaskBuf) in CaskBufQ
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END CaskBuf

EmpCask

NAME OF PART: EmpCask;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 9;
INTER ARRIVAL TIME: Undefined;
FIRST ARRIVAL AT: 0.0;
LOT SIZE: 9;
OUTPUT RULE: PUSH to CaskBuf;
PART ROUTE: None
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END EmpCask

mco_cask

NAME OF PART: mco_cask;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: None
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END mco_cask

TxToCskB

NAME OF MACHINE: TxToCskB;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (0.5,1,4,13);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 150.0;

```

* Repair time: 3.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;

LABOR:
 Repair: None;
 END

END BREAKDOWN DETAIL

ACTIONS, Finish
 Add

LastMCO (4) = LastMCO (3)

End Actions

INPUT RULE: Wait;

OUTPUT RULE: PUSH to CaskBuf;

REPORTING: Individual;

SHIFT: TXCskBS,0,0;

END TxToCskB

CaskTot

NAME OF VARIABLE: CaskTot;

QUANTITY: 1;

REPORTING: Yes;

END CaskTot

No_CaskW

NAME OF VARIABLE: No_CaskW;

QUANTITY: 1;

REPORTING: Yes;

END No_CaskW

No_CaskE

NAME OF VARIABLE: No_CaskE;

QUANTITY: 1;

REPORTING: Yes;

END No_CaskE

HC_Ctime

NAME OF VARIABLE: HC_Ctime;

QUANTITY: 1;

REPORTING: Yes;

END HC_Ctime

x

NAME OF VARIABLE: x;

QUANTITY: 1;

REPORTING: Yes;

END x

CaskBufQ

NAME OF HISTOGRAM: CaskBufQ;

QUANTITY: 1;

STATS RESET : Yes;

END CaskBufQ

FRWest

NAME OF LABOR: FRWest;

QUANTITY no shift: 1;

REPORTING: Yes;

END FRWest

countmco

NAME OF VARIABLE: countmco;

QUANTITY: 4;

REPORTING: Yes;

END countmco

VacNops

NAME OF VARIABLE: VacNops;

QUANTITY: 6;

REPORTING: Yes;

END VacNops

SD5_1day

NAME OF SHIFT: SD5_1day;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: 20.000000,4.000000,0.000000;

REPORTING: Yes;

END SD5_1day

SD5We

NAME OF SHIFT: SD5We;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: SD5_1day

SD5_1day;

REPORTING: Yes;

END SD5We

HCNops

NAME OF VARIABLE: HCNops;

QUANTITY: 6;

REPORTING: Yes;

END HCNops

WRU1_Day

NAME OF SHIFT: WRU1_Day;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: 2.000000,22.000000,0.000000;
REPORTING: Yes;

END WRU1_Day

WRU2_Day

NAME OF SHIFT: WRU2_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 5.000000,19.000000,0.000000;
REPORTING: Yes;

END WRU2_Day

WRU3_Day

NAME OF SHIFT: WRU3_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 8.000000,16.000000,0.000000;
REPORTING: Yes;

END WRU3_Day

WRU4_Day

NAME OF SHIFT: WRU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 11.000000,13.000000,0.000000;
REPORTING: Yes;

END WRU4_Day

WRU5_Day

NAME OF SHIFT: WRU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 14.000000,10.000000,0.000000;
REPORTING: Yes;

END WRU5_Day

WRU6_Day

NAME OF SHIFT: WRU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 17.000000,7.000000,0.000000;
REPORTING: Yes;

END WRU6_Day

WRU7_Day

NAME OF SHIFT: WRU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 20.000000,4.000000,0.000000;
REPORTING: Yes;

END WRU7_Day

ERU4_Day

NAME OF SHIFT: ERU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 3.000000,21.000000,0.000000;
REPORTING: Yes;

END ERU4_Day

ERU5_Day

NAME OF SHIFT: ERU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 9.000000,15.000000,0.000000;
REPORTING: Yes;

END ERU5_Day

ERU6_Day

NAME OF SHIFT: ERU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 15.000000,9.000000,0.000000;
REPORTING: Yes;

END ERU6_Day

ERU7_Day

NAME OF SHIFT: ERU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 20.000000,4.000000,0.000000;
REPORTING: Yes;

END ERU7_Day

ERU4_Mon

NAME OF SHIFT: ERU4_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;

B-133

REPORTING: Yes;

END ERU4 Mon

ERU5 Mon

SHIFT DATA: ERU5_Day

[illegible]

ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day;
REPORTING: Yes;

END ERU5 Mon

ERU6 Mon

NAME OF SHIFT: ERU6 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU6 Day

[illegible]

REPORTING: Yes;

END ERU6 Mon

ERU7 Mon

NAME OF SHIFT: ERU7 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU7 Day

```

ERU7 Day
ERU7 Day
ERU7 Day
ERU7 Day
SD5We;
REPORTING: Yes;

```


B-135

END WRU4 Mon

NAME OF SHIFT: WRU5 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU5 Day

SNF7 20.LST 7-17-96 1:38p

WRU6 Mon

HRU6 Day

REPORTING: Yes;

WRU7_Mon

REPORTING: Yes:

```

END WRU7_Mon
WRetSh

NAME OF SHIFT: WRetSh;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
ACTIONS, End
Add
  IF TIME > 4368
    Wshift = WShRep
    IF Done (1) > 1
      Wshift = Woff
    ENDIF
  ENDIF
End Actions
SHIFT DATA: WRU1_Mon
WRU2_Mon
WRU3_Mon
WRU4_Mon
WRU5_Mon
WRU6_Mon;
REPORTING: Yes;

END WRetSh

ERetSh

NAME OF SHIFT: ERetSh;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 2184.000000;
ACTIONS, End
Add
  IF TIME > 4368
    Eshift = EShRep
    IF Done (2) > 1
      Eshift = Eoff
    ENDIF
  ENDIF
End Actions
SHIFT DATA: ERU4_Mon
ERU5_Mon
ERU6_Mon;
REPORTING: Yes;

END ERetSh

Wshift

NAME OF VARIABLE: Wshift;
QUANTITY: 1;
REPORTING: Yes;

END Wshift

WShRep

NAME OF SHIFT: WShRep;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;

```

```

  Rest time: 0.000000;
  SHIFT DATA: WRU7_Mon;
  REPORTING: Yes;

END WShRep

EShRep

NAME OF SHIFT: EShRep;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
  SHIFT DATA: ERU7_Mon;
  REPORTING: Yes;

END EShRep

EShift

NAME OF VARIABLE: EShift;
QUANTITY: 1;
REPORTING: Yes;

END EShift

Eoff

NAME OF SHIFT: Eoff;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
  SHIFT DATA: 0.000000,168.000000,0.000000;
  REPORTING: Yes;

END Eoff

Woff

NAME OF SHIFT: Woff;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
  SHIFT DATA: 0.000000,168.000000,0.000000;
  REPORTING: Yes;

END Woff

Days7

NAME OF SHIFT: Days7;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
  SHIFT DATA: 168.000000,0.000000,0.000000;
  REPORTING: Yes;

END Days7

VDSHift

NAME OF VARIABLE: VDSHift;
QUANTITY: 1;

```

```

REPORTING: Yes;
END VDShift
CskLdWS
NAME OF VARIABLE: CskLdWS;
QUANTITY: 1;
REPORTING: Yes;
END CskLdWS
CskLdES
NAME OF VARIABLE: CskLdES;
QUANTITY: 1;
REPORTING: Yes;
END CskLdES
TxToCVDS
NAME OF VARIABLE: TxToCVDS;
QUANTITY: 1;
REPORTING: Yes;
END TxToCVDS
Tx1KZES
NAME OF VARIABLE: Tx1KZES;
QUANTITY: 1;
REPORTING: Yes;
END Tx1KZES
CSBCaskS
NAME OF VARIABLE: CSBCaskS;
QUANTITY: 1;
REPORTING: Yes;
END CSBCaskS
TxCskBS
NAME OF VARIABLE: TxCskBS;
QUANTITY: 1;
REPORTING: Yes;
END TxCskBS
LestMCO
NAME OF VARIABLE: LestMCO;
QUANTITY: 4;
REPORTING: Yes;
END LestMCO
END SELECT
END DETAIL
INITIALISE
Add

```

```

*****
Time Units are in HOURS
*****
!KE Basic
Supply (1) = 200
!KW Basin
Supply (2) = 200
Wshift = WRetSh
EShift = ERetSh
CskLdWS = Days5
CskLdES = Days5E
TxToCVDS = Days5
VDShift = Days7
Tx1KZES = Days5
CSBCaskS = Days5
TxCskBS = Days5
End Actions
END INITIALISE

```

CASE 8. THREE 8 HR SHIFTS/DAY, 7 DAYS/WEEK.
USING 5 COLD VACUUM DRYING STATIONS

SNF Project operating 3 shifts, 7 days/week. Cold vacuum drying has 5 stations

B-139

SNF Project operating 3 shifts, 7 days/week. Cold vacuum drying has 5 stations

SNF Project operating 3 shifts, 7 days/week. Cold vacuum drying has 5 stations

! WITNESS MODEL: 7D18HR5V

Base Model - 7 days/wk, 18 hrs/day
5 Cold Vacuum Units

CLOCK

UNIT : Hours;
MULTIPLE : 1,Day,24,0;
MULTIPLE : 2,Week,7,0;
MULTIPLE : 3,,0,0;
RATIO : 1:1;
DISPLAY : USER;
END CLOCK

DETAIL

OPTIONS

BREAKDOWN MODEL: Mean;
PRN Stream : 1;
REPAIR MODEL: Actual;
LABOR TO UNLOAD : No;
WARMUP PERIOD : 0.00;
OUTPUT INTERVAL : None;
UNBLOCK BASIS : Priority;
MONITOR STEP : Undefined;
MIXTURE STEP : Undefined;
MODULE ELEMENT NAMES : Use local preferences;
END OPTIONS

SELECT

CskLoadW

NAME OF MACHINE: CskLoadW;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (12,16,9,26,N + 4);

BREAKDOWN DETAIL

Breakdown number: 1
• Mode: Available time;
• Down interval: 35.0;
• Repair time: 7.0;
• Scrap part: No;
• Description: Breakdown Number 1
• Setup on repair: No;
• Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add

CHANGE ALL to mco_cask
countmco (1) = countmco (1) + 1
IF countmco (1) = 200

DESC = "LstW"
Done (3) = TIME
ENDIF
End Actions
INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(1)#(1),
CaskBuf#(1);
OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLdWS,0,0;

END CskLoadW

Vacuum

NAME OF MACHINE: Vacuum;
QUANTITY: 5;
TYPE: Single;
PRIORITY: Lowest;
LABOR:

Cycle: None;
END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (74,84,113,N + 6);

BREAKDOWN DETAIL

Breakdown number: 1
• Mode: Available time;
• Down interval: 40.0;
• Repair time: 40.0;
• Scrap part: No;
• Description: Breakdown Number 1
• Setup on repair: No;
• Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add

Inote that its the first time through

PEN = 1
VacNops (1) = NOPS (Vacuum(1))
VacNops (2) = NOPS (Vacuum(2))
VacNops (3) = NOPS (Vacuum(3))
VacNops (4) = NOPS (Vacuum(4))
VacNops (5) = NOPS (Vacuum(5))
IVacNops (6) = NOPS (Vacuum(6))

IF DESC = "LstW" OR DESC = "LstE"
LastMCO (1) = LastMCO (1) + 1
Done (6) = TIME
ENDIF

End Actions
INPUT RULE: Wait;
OUTPUT RULE: IF ISTATE (CSBCask) = 1
PUSH to Tx1KToZE
ELSE
Wait
ENDIF;
REPORTING: Individual;
SHIFT: VDShift,0,0;

END Vacuum

MCO

NAME OF PART: MCO;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: END
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END MCO

FuelBasQ

NAME OF HISTOGRAM: FuelBasQ;
QUANTITY: 1;
STATS RESET : Yes;

END FuelBasQ

BasinBuf

NAME OF BUFFER: BasinBuf;
QUANTITY: 2;
CAPACITY: 2;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add

!RECORD MPARTS (BasinBuf(2)) in FuelBasQ
!totobs = !HNUM (FuelBasQ)
!cellone = !MCELL (FuelBasQ,1)
!onepc = cellone / totobs
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END BasinBuf

FuelRetW

NAME OF MACHINE: FuelRetW;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:

Cycle: None;
END

DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (36,37,50,N);
BREAKDOWN_DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 17.0;
* Scrap part: No;

* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:

Repair: None;
END

END BREAKDOWN_DETAIL

ACTIONS, Start

Add
Supply (1) = Supply (1) - 1

End Actions
ACTIONS, Finish

Add
IF Supply (1) = 0
Done (1) = TIME

ENDIF

End Actions
INPUT RULE: IF Supply (1) > 0
PULL from MCO out of WORLD
ELSE
Wait

ENDIF;
OUTPUT RULE: PUSH to BasinBuf(1);
REPORTING: Individual;
SHIFT: Wshift,0,0;

END FuelRetW

basbufpc

NAME OF VARIABLE: basbufpc;
QUANTITY: 1;
REPORTING: Yes;

END basbufpc

Tx1Kto2E

NAME OF MACHINE: Tx1Kto2E;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:

Cycle: None;
END

DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (0.5,1,4,13);
BREAKDOWN_DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 150.0;
* Repair time: 3.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;

LABOR:
Repair: None;
END

END BREAKDOWN_DETAIL
ACTIONS, Finish

MHC-SD-SNF-RPT-011
Rev. 0

1044911

Add
 IF DESC = "LstW" OR DESC = "LstE"
 LastMCO (2) = LastMCO (2) + 1
 Done (7) = TIME
 ENDIF
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to CSBCask;
 REPORTING: Individual;
 SHIFT: Tx1K2ES,0,0;
 END Tx1KToZE
 MHMTx
 NAME OF MACHINE: MHMTx;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (3,3.25,4,15);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 6.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 IF PEN = 3
 Complete = Complete + 1
 IF MWIP (MCO) = 1 all MCO's are complete
 STOP
 ENDIF
 ENDIF
 End Actions
 INPUT RULE: IF ISTATE (HotCond(1)) = 0
 Wait
 ELSE
 IF NPARTS (HotCond) > 5
 PULL from HotCond
 ELSE
 PULL from CSB
 ENDIF
 ENDIF;
 OUTPUT RULE: SELECT on PEN CSB,HotCond,SHIP;
 REPORTING: Individual;
 SHIFT: Days5,0,0;
 END MHMTx

FuelRetE
 NAME OF MACHINE: FuelRetE;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (36,37,50,W);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 35.0;
 * Repair time: 17.0;
 * Scrap parts: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Start
 Add
 Supply (2) = Supply (2) - 1
 End Actions
 ACTIONS, Finish
 Add
 IF Supply (2) = 0
 Done (2) = TIME
 ENDIF
 End Actions
 INPUT RULE: IF Supply (2) > 0
 PULL from MCO out of WORLD
 ELSE
 Wait
 ENDIF;
 OUTPUT RULE: PUSH to BasinBuf(2);
 REPORTING: Individual;
 SHIFT: EShift,0,0;
 END FuelRetE
 CSBCask
 NAME OF MACHINE: CSBCask;
 QUANTITY: 1;
 TYPE: Production;
 * Part type: EmpCask;
 * Production qty: 1;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None

END
CYCLE TIME: TRIANGLE (10.4,11.4,13.4,14);
BREAKDOWN_DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 300.0;
* Repair time: 6.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
CHANGE mco cask to MCO
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (3) = LastMCO (3) + 1
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH EmpCask to TxToCskB,MCO to MHMTX;
REPORTING: Individual;
SHIFT: CSBcasks,0,0;
END CSBcask
HotCond
NAME OF MACHINE: HotCond;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: HC CTime;
BREAKDOWN_DETAIL
Breakdown number: 1
* Mode: Busy time;
* Down interval: 40.0;
* Repair time: 60.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Start
Add
x = RANDOM (98)
IF x < 0.8
HC CTime = 140
ELSE
HC CTime = 205
ENDIF

End Actions
ACTIONS, Finish
Add
PEN = 3
HCNops (1) = NOPS (HotCond(1))
HCNops (2) = NOPS (HotCond(2))
HCNops (3) = NOPS (HotCond(3))
HCNops (4) = NOPS (HotCond(4))
HCNops (5) = NOPS (HotCond(5))
HCNops (6) = NOPS (HotCond(6))
IF DESC = "LstW" OR DESC = "LstE"
Done (8) = TIME
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to MHMTX;
REPORTING: Individual;
SHIFT: DelayHC,0,0;
END HotCond
Days5E
NAME OF SHIFT: Days5E;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 2184.000000;
SHIFT DATA: SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5le;
REPORTING: Yes;
END Days5E
onepc
NAME OF VARIABLE: onepc;
QUANTITY: 1;
REPORTING: Yes;
END onepc
totobs
NAME OF VARIABLE: totobs;
QUANTITY: 1;
REPORTING: Yes;
END totobs
CSB
NAME OF BUFFER: CSB;
QUANTITY: 1;
CAPACITY: 1000;
DELAY MODE: None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add
I make it its second pass

```

PEN = 2
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END CSB

cellone

NAME OF VARIABLE: cellone;
QUANTITY: 1;
REPORTING: Yes;

END cellone

CskLoadE

NAME OF MACHINE: CskLoadE;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (12,16,9,26,N + 4);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 35.0;
  * Repair time: 7.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
  LABOR:
    Repair: None;
  END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
  CHANGE ALL to mco_cask
  countmco (2) = countmco (2) + 1
  IF countmco (2) = 200
    Done (4) = TIME
    DESC = "LstE"
  ENDF
End Actions
INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(2)#(1),
  CaskBuf#(1);
OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLdES,0,0;

END CskLoadE

Days5

NAME OF SHIFT: Days5;
TYPE OF SHIFT: main;

```

```

OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
ACTIONS, End
Add
  IF Done (3) > 1 AND ISTATE (CskLoadM) <> 3
    CskLdMS = Woff
  ENDF
  IF Done (4) > 1 AND ISTATE (CskLoadE) <> 3
    CskLdES = Eoff
  ENDF
  IF countmco (1) = 200 AND countmco (2) = 200
    TxToCVDs = Eoff
  ENDF
  IF LastMCO (1) = 2 AND ISTATE (Vacuum(1)) <> 3
    VDShift = Eoff
  ENDF
  IF LastMCO (2) = 2 AND ISTATE (Tx1KToZE) <> 3
    Tx1KZES = Eoff
  ENDF
  IF LastMCO (3) = 2 AND ISTATE (CSBCask) <> 3
    CSBCasks = Eoff
  ENDF
  IF LastMCO (4) = 2 AND ISTATE (TxToCskB) <> 3
    TxCskBS = Eoff
  ENDF
End Actions
SHIFT DATA: SD5_1day
  SD5_1day
  SD5_1day
  SD5_1day
  SD5_1day
  SD5We;
REPORTING: Yes;

END Days5

Complete

NAME OF VARIABLE: Complete;
QUANTITY: 1;
REPORTING: Yes;

END Complete

Supply

NAME OF VARIABLE: Supply;
QUANTITY: 2;
REPORTING: Yes;

END Supply

TxToCVD

NAME OF MACHINE: TxToCVD;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :

```

Empty: None

END

CYCLE TIME: TRIANGLE (0.1,0.25,0.5,13);

BREAKDOWN_DETAIL

Breakdown number: 1

- * Mode: Available time;
- * Down interval: 150.0;
- * Repair time: 0.5;
- * Scrap part: No;
- * Description: Breakdown Number 1
- * Setup on repair: No;
- * Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Finish

Add

IF countmco (1) = 200 AND countmco (2) = 200

Done (5) = TIME

ENDIF

End Actions

INPUT RULE: Wait;

OUTPUT RULE: PUSH to Vacuum;

REPORTING: Individual;

SHIFT: TxToCVDS,0,0;

END TxToCVD

DelayHC

NAME OF SHIFT: DelayHC;

TYPE OF SHIFT: main;

OFFSET:

Working time: 0.000000;

Rest time: 6532.000000;

SHIFT DATA: 168.000000,0.000000,0.000000;

REPORTING: Yes;

END DelayHC

Done

NAME OF VARIABLE: Done;

QUANTITY: 8;

REPORTING: Yes;

END Done

VDryUse

NAME OF HISTOGRAM: VDryUse;

QUANTITY: 1;

STATS RESET : Yes;

END VDryUse

CaskBuf

NAME OF BUFFER: CaskBuf;

QUANTITY: 1;

CAPACITY: 100;

DELAY MODE : None;

INPUT POSITION: Rear;

OUTPUT SCAN FROM: Front;

- * Select: First;

ACTIONS, In

Add

!RECORD NPARTS (CaskBuf) in CaskBufQ

!totobs = !HNUM (CaskBufQ)

!cellone = !HCELL (CaskBufQ,1)

!onepc = cellone / totobs

End Actions

ACTIONS, Out

Add

RECORD 9 - NPARTS (CaskBuf) in CaskBufQ

End Actions

REPORTING: Individual;

SHIFT: Undefined,0;

END CaskBuf

EmpCask

NAME OF PART: EmpCask;

TYPE: Variable attributes;

GROUP NUMBER: 1;

MAXIMUM ARRIVALS: 9;

INTER ARRIVAL TIME: Undefined;

FIRST ARRIVAL AT: 0.0;

LOT SIZE: 9;

OUTPUT RULE: PUSH to CaskBuf;

PART ROUTE: None

REPORTING: Yes;

CONTAINS FLUIDS: No;

SHIFT: Undefined;

END EmpCask

mco_cask

NAME OF PART: mco_cask;

TYPE: Variable attributes;

GROUP NUMBER: 1;

MAXIMUM ARRIVALS: 0;

OUTPUT RULE: Wait;

PART ROUTE: None

REPORTING: Yes;

CONTAINS FLUIDS: No;

SHIFT: Undefined;

END mco_cask

TxToCskB

NAME OF MACHINE: TxToCskB;

QUANTITY: 1;

TYPE: Single;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (0.5,1,4,13);

BREAKDOWN_DETAIL

Breakdown number: 1

- * Mode: Available time;

```

* Down interval: 150.0;
* Repair time: 3.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
  LastMCO (4) = LastMCO (3)
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to CaskBuf;
REPORTING: Individual;
SHIFT: TxCskBS,0,0;

END TxToCskB

CaskTot

NAME OF VARIABLE: CaskTot;
QUANTITY: 1;
REPORTING: Yes;

END CaskTot

No_CaskW

NAME OF VARIABLE: No_CaskW;
QUANTITY: 1;
REPORTING: Yes;

END No_CaskW

No_CaskE

NAME OF VARIABLE: No_CaskE;
QUANTITY: 1;
REPORTING: Yes;

END No_CaskE

HC_CTime

NAME OF VARIABLE: HC_CTime;
QUANTITY: 1;
REPORTING: Yes;

END HC_CTime

x

NAME OF VARIABLE: x;
QUANTITY: 1;
REPORTING: Yes;

END x

CaskBufQ

NAME OF HISTOGRAM: CaskBufQ;
QUANTITY: 1;
STATS RESET : Yes;

```

```

END CaskBufQ

FRWest

NAME OF LABOR: FRWest;
QUANTITY no shift: 1;
REPORTING: Yes;

END FRWest

countmco

NAME OF VARIABLE: countmco;
QUANTITY: 4;
REPORTING: Yes;

END countmco

VacNOps

NAME OF VARIABLE: VacNOps;
QUANTITY: 6;
REPORTING: Yes;

END VacNOps

SD5_1day

NAME OF SHIFT: SD5_1day;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
  SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END SD5_1day

SD5We

NAME OF SHIFT: SD5We;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
  SHIFT DATA: SD5_1day
  SD5_1day;
REPORTING: Yes;

END SD5We

HCNOps

NAME OF VARIABLE: HCNops;
QUANTITY: 6;
REPORTING: Yes;

END HCNops

WRU1_Day

NAME OF SHIFT: WRU1_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;

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Rest time: 0.000000;
SHIFT DATA: 2.000000,22.000000,0.000000;
REPORTING: Yes;

END WRU1_Day

WRU2_Day

NAME OF SHIFT: WRU2_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 5.000000,19.000000,0.000000;
REPORTING: Yes;

END WRU2_Day

WRU3_Day

NAME OF SHIFT: WRU3_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 8.000000,16.000000,0.000000;
REPORTING: Yes;

END WRU3_Day

WRU4_Day

NAME OF SHIFT: WRU4_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 11.000000,13.000000,0.000000;
REPORTING: Yes;

END WRU4_Day

WRU5_Day

NAME OF SHIFT: WRU5_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 14.000000,10.000000,0.000000;
REPORTING: Yes;

END WRU5_Day

WRU6_Day

NAME OF SHIFT: WRU6_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 17.000000,7.000000,0.000000;
REPORTING: Yes;

END WRU6_Day

WRU7_Day

NAME OF SHIFT: WRU7_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END WRU7_Day

ERU4_Day

NAME OF SHIFT: ERU4_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 3.000000,21.000000,0.000000;
REPORTING: Yes;

END ERU4_Day

ERU5_Day

NAME OF SHIFT: ERU5_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 9.000000,15.000000,0.000000;
REPORTING: Yes;

END ERU5_Day

ERU6_Day

NAME OF SHIFT: ERU6_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 15.000000,9.000000,0.000000;
REPORTING: Yes;

END ERU6_Day

ERU7_Day

NAME OF SHIFT: ERU7_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END ERU7_Day

ERU4_Mon

NAME OF SHIFT: ERU4_Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;

B-150

END ERU5 Mon

ERU6 Mon

NAME OF SHIFT: ERU6 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU6 Day

REPORTING: Yes;

END ERU6 Mon

ERU7 Mon

NAME OF SHIFT: ERU7 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU7 Day

ERU7 Day
ERU7 Day
ERU7 Day
ERU7 Day
SD5We;
REPORTING: Yes;

B-152

B-152

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B-152

B-152

```

REPORTING: Yes;
END WRU7_Mon

WRetSh

NAME OF SHIFT: WRetSh;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
ACTIONS, End
Add
IF TIME > 4368
Wshift = WShRep
IF Done (1) > 1
Wshift = Woff
ENDIF
ENDIF
End Actions
SHIFT DATA: WRU1_Mon
WRU2_Mon
WRU3_Mon
WRU4_Mon
WRU5_Mon
WRU6_Mon;
REPORTING: Yes;

END WRetSh

ERetSh

NAME OF SHIFT: ERetSh;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 2184.000000;
ACTIONS, End
Add
IF TIME > 4368
Eshift = EShRep
IF Done (2) > 1
Eshift = Eoff
ENDIF
ENDIF
End Actions
SHIFT DATA: ERU4_Mon
ERU5_Mon
ERU6_Mon;
REPORTING: Yes;

END ERetSh

Wshift

NAME OF VARIABLE: Wshift;
QUANTITY: 1;
REPORTING: Yes;

END Wshift

WShRep

NAME OF SHIFT: WShRep;
TYPE OF SHIFT: main;
OFFSET:

```

```

Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU7_Mon;
REPORTING: Yes;

END WShRep

EShRep

NAME OF SHIFT: EShRep;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: ERU7_Mon;
REPORTING: Yes;

END EShRep

Eshift

NAME OF VARIABLE: Eshift;
QUANTITY: 1;
REPORTING: Yes;

END Eshift

Eoff

NAME OF SHIFT: Eoff;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 0.000000,168.000000,0.000000;
REPORTING: Yes;

END Eoff

Woff

NAME OF SHIFT: Woff;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 0.000000,168.000000,0.000000;
REPORTING: Yes;

END Woff

Days7

NAME OF SHIFT: Days7;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 168.000000,0.000000,0.000000;
REPORTING: Yes;

END Days7

VDshift

NAME OF VARIABLE: VDshift;

```

```

QUANTITY: 1;
REPORTING: Yes;

END VDSHIFT

CskLdWS

NAME OF VARIABLE: CskLdWS;
QUANTITY: 1;
REPORTING: Yes;

END CskLdWS

CskLdES

NAME OF VARIABLE: CskLdES;
QUANTITY: 1;
REPORTING: Yes;

END CskLdES

TxToCVDS

NAME OF VARIABLE: TxToCVDS;
QUANTITY: 1;
REPORTING: Yes;

END TxToCVDS

Tx1K2ES

NAME OF VARIABLE: Tx1K2ES;
QUANTITY: 1;
REPORTING: Yes;

END Tx1K2ES

CSBCaskS

NAME OF VARIABLE: CSBCaskS;
QUANTITY: 1;
REPORTING: Yes;

END CSBCaskS

TxCskBS

NAME OF VARIABLE: TxCskBS;
QUANTITY: 1;
REPORTING: Yes;

END TxCskBS

LastMCO

NAME OF VARIABLE: LastMCO;
QUANTITY: 4;
REPORTING: Yes;

END LastMCO

END SELECT

END DETAIL

INITIALISE

```

```

Add
*****
|
|           Time Units are in HOURS
|
|*****
|KE Basic
|   Supply (1) = 200
|KW Basin
|   Supply (2) = 200
|   Wshift = WRetSh
|   Eshift = ERetSh
|   CskLdWS = Days5
|   CskLdES = Days5E
|   TxToCVDS = Days5
|   VDSHIFT = Days7
|   Tx1K2ES = Days5
|   CSBCaskS = Days5
|   TxCskBS = Days5
|   End Actions
END INITIALISE

```

**CASE 9. THREE 8HR SHIFTS/DAY, 7 DAYS/WEEK.
USING 4 COLD VACUUM DRYING STATIONS.**

SNF Project operating 3 shifts, 7 days/week. Cold vacuum drying has 4 stations

B-156

SNF Project operating 3 shifts, 7 days/week. Cold vacuum drying has 4 stations

B-157

SNF Project operating 3 shifts, 7 days/week. Cold vacuum drying has 4 stations

B-158

WHC-SD-SNF-RPT-011
Rev. 0

1 WITNESS MODEL: 7D18HR4V

Base Model - 7 days/wk, 18 hrs/day
4 Cold Vacuum Units

CLOCK

UNIT : Hours;
MULTIPLE : 1,Day,24,0;
MULTIPLE : 2,Week,7,0;
MULTIPLE : 3,,0,0;
RATIO : 1:1;
DISPLAY : USER;
END CLOCK

DETAIL

OPTIONS

BREAKDOWN MODEL: Mean;
PRN Stream : 1;
REPAIR MODEL: Actual;
LABOR TO UNLOAD : No;
WARMUP PERIOD : 0.00;
OUTPUT INTERVAL : None;
UNBLOCK BASIS : Priority;
MONITOR STEP : Undefined;
MIXTURE STEP : Undefined;
MODULE ELEMENT NAMES : Use local preferences;
END OPTIONS

SELECT

CskLoadW

NAME OF MACHINE: CskLoadW;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);

BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add

CHANGE ALL to mco_cask
countmco (1) = countmco (1) + 1
IF countmco (1) = 200
DESC = "LstW"

Done (3) = TIME
ENDIF
End Actions
INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(1)#{1},
CskBuf(1);
OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLdWS,0,0;

END CskLoadW

Vacuum

NAME OF MACHINE: Vacuum;
QUANTITY: 4;
TYPE: Single;
PRIORITY: Lowest;
LABOR:

Cycle: None;
END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (74,84,113,N + 6);
BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 60.0;
* Repair time: 40.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add

Inote that its the first time through

PEN = 1
VacNops (1) = NOPS (Vacuum(1))
VacNops (2) = NOPS (Vacuum(2))
VacNops (3) = NOPS (Vacuum(3))
VacNops (4) = NOPS (Vacuum(4))
!VacNops (5) = NOPS (Vacuum(5))
!VacNops (6) = NOPS (Vacuum(6))
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (1) = LastMCO (1) + 1
Done (6) = TIME

ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: IF ISTATE (CSBCask) = 1
PUSH to Tx1Kto2E
ELSE
Wait
ENDIF;
REPORTING: Individual;
SHIFT: VDSHift,0,0;

END Vacuum

MHC-SD-SNF-RPT-011
Rev. 0

LOC 441116

MCO

NAME OF PART: MCO;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: END
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END MCO

FuelBasQ

NAME OF HISTOGRAM: FuelBasQ;
QUANTITY: 1;
STATS RESET: Yes;

END FuelBasQ

BasinBuf

NAME OF BUFFER: BasinBuf;
QUANTITY: 2;
CAPACITY: 2;
DELAY MODE: None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add
I RECORD NPARTS (BasinBuf(2)) in FuelBasQ
Itotobs = INNUM (FuelBasQ)
Icellone = INCELL (FuelBasQ,1)
Ionepc = cellone / totobs
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END BasinBuf

FuelRetW

NAME OF MACHINE: FuelRetW;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (36,37,50,M);
BREAKDOWN_DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 17.0;
* Scrap part: No;
* Description: Breakdown Number 1

* Setup on repair: No;
* Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Start

Add

Supply (1) = Supply (1) - 1

End Actions

ACTIONS, Finish

Add

IF Supply (1) = 0

Done (1) = TIME

ENDIF

End Actions

INPUT RULE: IF Supply (1) > 0

PULL from MCO out of WORLD

ELSE

Wait

ENDIF;

OUTPUT RULE: PUSH to BasinBuf(1);

REPORTING: Individual;

SHIFT: Wshift,0,0;

END FuelRetW

basbufpc

NAME OF VARIABLE: basbufpc;

QUANTITY: 1;

REPORTING: Yes;

END basbufpc

Tx1Kto2E

NAME OF MACHINE: Tx1Kto2E;

QUANTITY: 1;

TYPE: Single;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (0.5,1,4,13);

BREAKDOWN_DETAIL

Breakdown number: 1

* Mode: Available time;

* Down interval: 150.0;

* Repair time: 3.0;

* Scrap part: No;

* Description: Breakdown Number 1

* Setup on repair: No;

* Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Finish

Add

B-160

MHC-SD-SNF-RPT-011
Rev. 0

IF DESC = "LstW" OR DESC = "LstE"
 LastMCO (2) = LastMCO (2) + 1
 Done (7) = TIME

ENDIF

End Actions

INPUT RULE: Wait;

OUTPUT RULE: PUSH to CSBCask;

REPORTING: Individual;

SHIFT: Tx1K2ES,0,0;

END Tx1KTo2E

MHMTx

NAME OF MACHINE: MHMTx;

QUANTITY: 1;

TYPE: Single;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (3,3.25,4,15);

BREAKDOWN DETAIL

Breakdown number: 1

* Mode: Available time;

* Down interval: 150.0;

* Repair time: 6.0;

* Scrap part: No;

* Description: Breakdown Number 1

* Setup on repair: No;

* Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

IF PEN = 3

Complete = Complete + 1

IF MWIP (MCO) = 1 fall MCO's are complete

STOP

ENDIF

ENDIF

End Actions

INPUT RULE: IF ISTATE (HotCond(1)) = 0

Wait

ELSE

IF NPARTS (HotCond) > 5

PULL from HotCond

ELSE

PULL from CSB

ENDIF

ENDIF;

OUTPUT RULE: SELECT on PEN CSB,HotCond,SHIP;

REPORTING: Individual;

SHIFT: Days5,0,0;

END MHMTx

FuelRetE

NAME OF MACHINE: FuelRetE;

QUANTITY: 1;

TYPE: Single;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (36,37,50,N);

BREAKDOWN DETAIL

Breakdown number: 1

* Mode: Available time;

* Down interval: 35.0;

* Repair time: 17.0;

* Scrap part: No;

* Description: Breakdown Number 1

* Setup on repair: No;

* Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Start

Add

Supply (2) = Supply (2) - 1

End Actions

ACTIONS, Finish

Add

IF Supply (2) = 0

Done (2) = TIME

ENDIF

End Actions

INPUT RULE: IF Supply (2) > 0

PULL from MCO out of WORLD

ELSE

Wait

ENDIF;

OUTPUT RULE: PUSH to BasinBuf(2);

REPORTING: Individual;

SHIFT: EShift,0,0;

END FuelRetE

CSBCask

NAME OF MACHINE: CSBCask;

QUANTITY: 1;

TYPE: Production;

* Part type: EmpCask;

* Production qty: 1;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (10.4,11.4,13.4,14);

BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 300.0;
* Repair time: 6.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

Add

CHANGE mco cask to MCO
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (3) = LastMCO (3) + 1
ENDIF

End Actions

INPUT RULE: Wait;
OUTPUT RULE: PUSH EmpCask to TxToCaskB,MCO to MHMTX;
REPORTING: Individual;
SHIFT: CSBCaskS,0,0;

END CSBCask

HotCond

NAME OF MACHINE: HotCond;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: HC CTime;

BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Busy time;
* Down interval: 40.0;
* Repair time: 60.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Start

Add

x = RANDOM (98)
IF x < 0.8
HC CTime = 140
ELSE
HC CTime = 205
ENDIF

End Actions

ACTIONS, Finish

Add

PEN = 3
HCNOps (1) = NOPS (HotCond(1))
HCNOps (2) = NOPS (HotCond(2))
HCNOps (3) = NOPS (HotCond(3))
HCNOps (4) = NOPS (HotCond(4))
HCNOps (5) = NOPS (HotCond(5))
HCNOps (6) = NOPS (HotCond(6))
IF DESC = "LstW" OR DESC = "LstE"
Done (8) = TIME

ENDIF

End Actions

INPUT RULE: Wait;
OUTPUT RULE: PUSH to MHMTX;
REPORTING: Individual;
SHIFT: DelayHC,0,0;

END HotCond

Days5E

NAME OF SHIFT: Days5E;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 2184.000000;
SHIFT DATA: SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5We;

REPORTING: Yes;

END Days5E

onepc

NAME OF VARIABLE: onepc;
QUANTITY: 1;
REPORTING: Yes;

END onepc

totobs

NAME OF VARIABLE: totobs;
QUANTITY: 1;
REPORTING: Yes;

END totobs

CSB

NAME OF BUFFER: CSB;
QUANTITY: 1;
CAPACITY: 1000;
DELAY MODE: None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In

Add

Imake it its second pass

PEN = 2

End Actions
 REPORTING: Individual;
 SHIFT: Undefined,0;
 END CSB
 cellone
 NAME OF VARIABLE: cellone;
 QUANTITY: 1;
 REPORTING: Yes;
 END cellone
 CskLoadE
 NAME OF MACHINE: CskLoadE;
 QUANTITY: 1;
 TYPE: Assembly;
 * Assembly quantity: 2;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 35.0;
 * Repair time: 7.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 CHANGE ALL to mco_cask
 countmco (2) = countmco (2) + 1
 IF countmco (2) = 200
 Done (4) = TIME
 DESC = "LstE"
 ENDIF
 End Actions
 INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(2)#(1),
 CaskBuf#(1);
 OUTPUT RULE: PUSH to TxToCVD;
 REPORTING: Individual;
 SHIFT: CskLdES,0,0;
 END CskLoadE
 Days5
 NAME OF SHIFT: Days5;
 TYPE OF SHIFT: main;
 OFFSET:

Working time: 0.000000;
 Rest time: 0.000000;
 ACTIONS, End
 Add
 IF Done (3) > 1 AND ISTATE (CskLoadW) <> 3
 CskLdWS = Woff
 ENDIF
 IF Done (4) > 1 AND ISTATE (CskLoadE) <> 3
 CskLdES = Eoff
 ENDIF
 IF countmco (1) = 200 AND countmco (2) = 200
 TxToCVDs = Eoff
 ENDIF
 IF LastMCO (1) = 2 AND ISTATE (Vacuum(1)) <> 3
 VDShift = Eoff
 ENDIF
 IF LastMCO (2) = 2 AND ISTATE (Tx1KTo2E) <> 3
 Tx1K2ES = Eoff
 ENDIF
 IF LastMCO (3) = 2 AND ISTATE (CSBCask) <> 3
 CSBCaskS = Eoff
 ENDIF
 IF LastMCO (4) = 2 AND ISTATE (TxToCskB) <> 3
 TxToCskBS = Eoff
 ENDIF
 End Actions
 SHIFT DATA: SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5We;
 REPORTING: Yes;
 END Days5
 Complete
 NAME OF VARIABLE: Complete;
 QUANTITY: 1;
 REPORTING: Yes;
 END Complete
 Supply
 NAME OF VARIABLE: Supply;
 QUANTITY: 2;
 REPORTING: Yes;
 END Supply
 TxToCVD
 NAME OF MACHINE: TxToCVD;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None

END
 CYCLE TIME: TRIANGLE (0.1,0.25,0.5,13);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 0.5;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 IF countmco (1) = 200 AND countmco (2) = 200
 Done (5) = TIME
 ENDIF
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to Vacuum;
 REPORTING: Individual;
 SHIFT: TxToCvds,0,0;

 END TxToCvD

 DelayHC

 NAME OF SHIFT: DelayHC;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 6352.000000;
 SHIFT DATA: 168.000000,0.000000,0.000000;
 REPORTING: Yes;

 END DelayHC

 Done

 NAME OF VARIABLE: Done;
 QUANTITY: 8;
 REPORTING: Yes;

 END Done

 VDryUse

 NAME OF HISTOGRAM: VDryUse;
 QUANTITY: 1;
 STATS RESET : Yes;

 END VDryUse

 CaskBuf

 NAME OF BUFFER: CaskBuf;
 QUANTITY: 1;
 CAPACITY: 100;
 DELAY MODE : None;
 INPUT POSITION: Rear;
 OUTPUT SCAN FROM: Front;
 * Select: First;
 ACTIONS, In

Add
 !RECORD NPARTS (CaskBuf) in CaskBufq
 !totobs = !INUM (CaskBufq)
 !cellone = !INCELL (CaskBufq,1)
 !onepc = cellone / totobs
 End Actions
 ACTIONS, Out
 Add
 RECORD 9 - NPARTS (CaskBuf) in CaskBufq
 End Actions
 REPORTING: Individual;
 SHIFT: Undefined,0;

 END CaskBuf

 EmpCask

 NAME OF PART: EmpCask;
 TYPE: Variable attributes;
 GROUP NUMBER: 1;
 MAXIMUM ARRIVALS: 9;
 INTER ARRIVAL TIME: Undefined;
 FIRST ARRIVAL AT: 0.0;
 LOT SIZE: 9;
 OUTPUT RULE: PUSH to CaskBuf;
 PART ROUTE: None
 REPORTING: Yes;
 CONTAINS FLUIDS: No;
 SHIFT: Undefined;

 END EmpCask

 mco_cask

 NAME OF PART: mco_cask;
 TYPE: Variable attributes;
 GROUP NUMBER: 1;
 MAXIMUM ARRIVALS: 0;
 OUTPUT RULE: Wait;
 PART ROUTE: None
 REPORTING: Yes;
 CONTAINS FLUIDS: No;
 SHIFT: Undefined;

 END mco_cask

 TxToCskB

 NAME OF MACHINE: TxToCskB;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None

 END
 DISCRETE LINKS :
 Empty: None

 END
 CYCLE TIME: TRIANGLE (0.5,1,4,13);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;

```

* Repair time: 3.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add
  LastMCO (4) = LastMCO (3)
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to CaskBuf;
REPORTING: Individual;
SHIFT: TxCskB,0,0;

END TxToCskB

CaskTot
NAME OF VARIABLE: CaskTot;
QUANTITY: 1;
REPORTING: Yes;

END CaskTot

No_CaskW
NAME OF VARIABLE: No_CaskW;
QUANTITY: 1;
REPORTING: Yes;

END No_CaskW

No_CasKE
NAME OF VARIABLE: No_CasKE;
QUANTITY: 1;
REPORTING: Yes;

END No_CasKE

HC_CTime
NAME OF VARIABLE: HC_CTime;
QUANTITY: 1;
REPORTING: Yes;

END HC_CTime

x
NAME OF VARIABLE: x;
QUANTITY: 1;
REPORTING: Yes;

END x

CaskBufQ
NAME OF HISTOGRAM: CaskBufQ;
QUANTITY: 1;
STATS RESET : Yes;

```

```

END CaskBufQ

FRWest
NAME OF LABOR: FRWest;
QUANTITY no shift: 1;
REPORTING: Yes;

END FRWest

countmco
NAME OF VARIABLE: countmco;
QUANTITY: 4;
REPORTING: Yes;

END countmco

VacNops
NAME OF VARIABLE: VacNops;
QUANTITY: 6;
REPORTING: Yes;

END VacNops

SD5_1day
NAME OF SHIFT: SD5_1day;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END SD5_1day

SD5We
NAME OF SHIFT: SD5We;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
SHIFT DATA: SD5_1day
  SD5_1day;
REPORTING: Yes;

END SD5We

HCNops
NAME OF VARIABLE: HCNops;
QUANTITY: 6;
REPORTING: Yes;

END HCNops

WRU1_Day
NAME OF SHIFT: WRU1_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;

```


SHIFT DATA: 2.000000,22.000000,0.000000;
REPORTING: Yes;

END WRU1_Day

WRU2_Day

NAME OF SHIFT: WRU2_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 5.000000,19.000000,0.000000;
REPORTING: Yes;

END WRU2_Day

WRU3_Day

NAME OF SHIFT: WRU3_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 8.000000,16.000000,0.000000;
REPORTING: Yes;

END WRU3_Day

WRU4_Day

NAME OF SHIFT: WRU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 11.000000,13.000000,0.000000;
REPORTING: Yes;

END WRU4_Day

WRU5_Day

NAME OF SHIFT: WRU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 14.000000,10.000000,0.000000;
REPORTING: Yes;

END WRU5_Day

WRU6_Day

NAME OF SHIFT: WRU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 17.000000,7.000000,0.000000;
REPORTING: Yes;

END WRU6_Day

WRU7_Day

NAME OF SHIFT: WRU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END WRU7_Day

ERU4_Day

NAME OF SHIFT: ERU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 3.000000,21.000000,0.000000;
REPORTING: Yes;

END ERU4_Day

ERU5_Day

NAME OF SHIFT: ERU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 9.000000,15.000000,0.000000;
REPORTING: Yes;

END ERU5_Day

ERU6_Day

NAME OF SHIFT: ERU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 15.000000,9.000000,0.000000;
REPORTING: Yes;

END ERU6_Day

ERU7_Day

NAME OF SHIFT: ERU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END ERU7_Day

ERU4_Mon

NAME OF SHIFT: ERU4_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;

B-167

[illegible]

REPORTING: Yes;

END ERU4 Mon

ERU5 Mon

NAME OF SHIFT: ERU5 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: ERU5 Day

[illegible]

ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day
ERU5_Day;
REPORTING: Yes;

END ERU5 Mon

ERU6 Mon

NAME OF SHIFT: ERU6 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;

SHIFT DATA: ERU6_Day

[illegible]

ERU6 Day;
REPORTING: Yes:

END ERU6 Mon

ERU7 Mon

NAME OF SHIFT: ERU7 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000:

SHIFT_DATA: ERU7_Day

ERU7 Day
ERU7 Day
ERU7 Day
ERU7 Day
SD5We;

REPORTING: Yes:

END ERU7_Mon

WRU1_Mon

NAME OF SHIFT: WRU1 Mon;
TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

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WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day;

REPORTING: Yes;

END WRU1_Mon

WRU2_Mon

NAME OF SHIFT: WRU2 Mon;
TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

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WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day;

REPORTING: Yes;

END WRU2_Mon

WRU3_Mon

NAME OF SHIFT: WRU3 Mon;
TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day;

REPORTING: Yes;

END WRU3_Mon

WRU4_Mon

NAME OF SHIFT: WRU4 Mon;
TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;


```

END WRU7_Mon
WRetSh

NAME OF SHIFT: WRetSh;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
ACTIONS, End
Add
  IF TIME > 4368
    Wshift = WShRep
    IF Done (1) > 1
      Wshift = Woff
    ENDIF
  ENDIF
End Actions
SHIFT DATA: WRU1_Mon
WRU2_Mon
WRU3_Mon
WRU4_Mon
WRU5_Mon
WRU6_Mon;
REPORTING: Yes;

END WRetSh

ERetSh

NAME OF SHIFT: ERetSh;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 2184.000000;
ACTIONS, End
Add
  IF TIME > 4368
    Eshift = EShRep
    IF Done (2) > 1
      Eshift = Eoff
    ENDIF
  ENDIF
End Actions
SHIFT DATA: ERU4_Mon
ERU5_Mon
ERU6_Mon;
REPORTING: Yes;

END ERetSh

Wshift

NAME OF VARIABLE: Wshift;
QUANTITY: 1;
REPORTING: Yes;

END Wshift

WShRep

NAME OF SHIFT: WShRep;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;

```

```

  Rest time: 0.000000;
  SHIFT DATA: WRU7_Mon;
  REPORTING: Yes;

END WShRep

EShRep

NAME OF SHIFT: EShRep;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
  SHIFT DATA: ERU7_Mon;
  REPORTING: Yes;

END EShRep

EShift

NAME OF VARIABLE: EShift;
QUANTITY: 1;
REPORTING: Yes;

END EShift

Eoff

NAME OF SHIFT: Eoff;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
  SHIFT DATA: 0.000000,168.000000,0.000000;
  REPORTING: Yes;

END Eoff

Woff

NAME OF SHIFT: Woff;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
  SHIFT DATA: 0.000000,168.000000,0.000000;
  REPORTING: Yes;

END Woff

Days7

NAME OF SHIFT: Days7;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
  SHIFT DATA: 168.000000,0.000000,0.000000;
  REPORTING: Yes;

END Days7

VDShift

NAME OF VARIABLE: VDShift;
QUANTITY: 1;

```

B-171

WHC-SD-SNF-RPT-011
Rev. 0

CASE 10. THREE 8HR SHIFTS/DAY, 7 DAYS/WEEK.
USING 2 LOADIN/LOADOUT PITS IN THE CSB.

SNF Project operating 3 shifts, 7 days/week with two loadin/loadout pits in the CSB

B-173

SNF Project operating 3 shifts, 7 days/week with two loadin/loadout pits in the CSB

SNF Project operating 3 shifts, 7 days/week with two loadin/loadout pits in the CSB

B-175

WHC-SD-SNF-RPT-011
Rev. 0

1 WITNESS MODEL: ZMCOP718

- * Base Model - 7 days/wk, 18 hrs/day
- 2 MCO Pits

CLOCK

UNIT : Hours;
MULTIPLE : 1,Day,24,0;
MULTIPLE : 2,Week,7,0;
MULTIPLE : 3,,0,0;
RATIO : 1:1;
DISPLAY : USER;
END CLOCK

DETAIL

OPTIONS

BREAKDOWN MODEL: Mean;
PRN Stream : 1;
REPAIR MODEL: Actual;
LABOR TO UNLOAD : No;
WARMUP PERIOD : 0.00;
OUTPUT INTERVAL : None;
UNBLOCK BASIS : Priority;
MONITOR STEP : Undefined;
MIXTURE STEP : Undefined;
MODULE ELEMENT NAMES : Use local preferences;
END OPTIONS

SELECT

CskLoadW

NAME OF MACHINE: CskLoadW;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);

BREAKDOWN_DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN_DETAIL
ACTIONS, Finish

Add
CHANGE ALL to mco cask
countmco (1) = countmco (1) + 1
IF countmco (1) = 200
DESC = "LstW"

Done (3) = TIME

ENDIF

End Actions

INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(1) #(1),
CaskBuf#(1);
OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLdWS,0,0;

END CskLoadW

Vacuum

NAME OF MACHINE: Vacuum;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:

Cycle: None;
END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (74,84,113,N + 6);

BREAKDOWN_DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 40.0;
* Repair time: 40.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:

Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Finish

Add

Inote that its the first time through

PEN = 1
VacNops (1) = NOPS (Vacuum(1))
VacNops (2) = NOPS (Vacuum(2))
VacNops (3) = NOPS (Vacuum(3))
VacNops (4) = NOPS (Vacuum(4))
VacNops (5) = NOPS (Vacuum(5))
VacNops (6) = NOPS (Vacuum(6))
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (1) = LastMCO (1) + 1
Done (6) = TIME

ENDIF

End Actions

INPUT RULE: Wait;
OUTPUT RULE: IF ISTATE (CSBCask(1)) = 1 OR ISTATE (CSBCask(2)) = 1
PUSH to Tx1KtoZE
ELSE
Wait
ENDIF;
REPORTING: Individual;
SHIFT: VdShift,0,0;

END Vacuum

WHC-SD-SNF-RPT-011
Rev. 0

10/14/91

MCO

NAME OF PART: MCO;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: END
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END MCO

FuelBasQ

NAME OF HISTOGRAM: FuelBasQ;
QUANTITY: 1;
STATS RESET: Yes;

END FuelBasQ

BasinBuf

NAME OF BUFFER: BasinBuf;
QUANTITY: 2;
CAPACITY: 2;
DELAY MODE: None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add

IRECORD NPARTS (BasinBuf(2)) in FuelBasQ

totobs = INNUM (FuelBasQ)
icellone = IXCCELL (FuelBasQ,1)

ionepe = cellone / totobs

End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END BasinBuf

FuelRetW

NAME OF MACHINE: FuelRetW;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END

DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (36,37,50,N);

BREAKDOWN_DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 17.0;
* Scrap part: No;
* Description: Breakdown Number 1

* Setup on repair: No;
* Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Start

Add

Supply (1) = Supply (1) - 1

End Actions

ACTIONS, Finish

Add

IF Supply (1) = 0

Done (1) = TIME

ENDIF

End Actions

INPUT RULE: IF Supply (1) > 0

PULL from MCO out of WORLD

ELSE

Wait

ENDIF;

OUTPUT RULE: PUSH to BasinBuf(1);

REPORTING: Individual;

SHIFT: Wshift,0,0;

END FuelRetW

basbufpc

NAME OF VARIABLE: basbufpc;

QUANTITY: 1;

REPORTING: Yes;

END basbufpc

Tx1Kto2E

NAME OF MACHINE: Tx1Kto2E;

QUANTITY: 1;

TYPE: Single;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (0.5,1,4,13);

BREAKDOWN_DETAIL

Breakdown number: 1

* Mode: Available time;

* Down interval: 150.0;

* Repair time: 3.0;

* Scrap part: No;

* Description: Breakdown Number 1

* Setup on repair: No;

* Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN_DETAIL

ACTIONS, Finish

Add

MHC-SD-SNF-RPT-011
Rev. 0

10/2/2011

IF DESC = "LstW" OR DESC = "LstE"
 LastMCO (2) = LastMCO (2) + 1
 Done (7) = TIME
 ENDIF
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: IF ISTATE (CSBCask(1)) = 1
 PUSH to CSBCask(1)
 ELSE
 PUSH to CSBCask(2)
 ENDIF;
 REPORTING: Individual;
 SHIFT: Tx1K2ES,0,0;

 END Tx1KToZE

 MHMTx

 NAME OF MACHINE: MHMTx;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (3,3.25,4,15);
 BREAKDOWN_DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 6.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN_DETAIL
 ACTIONS, Finish
 Add
 IF PEN = 3
 Complete = Complete + 1
 IF MWIP (MCO) = 1 !all MCO's are complete
 STOP
 ENDIF
 ENDIF
 End Actions
 INPUT RULE: IF ISTATE (HotCond(1)) = 0
 Wait
 ELSE
 IF NPARTS (HotCond) > 5
 PULL from HotCond
 ELSE
 PULL from CSB
 ENDIF
 ENDIF
 OUTPUT RULE: SELECT on PEN CSB,HotCond,SHIP;
 REPORTING: Individual;
 SHIFT: Days5,0,0;

END MHMTx

 FuelRetE

 NAME OF MACHINE: FuelRetE;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (36,37,50,N);
 BREAKDOWN_DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 35.0;
 * Repair time: 17.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN_DETAIL
 ACTIONS, Start
 Add
 Supply (2) = Supply (2) - 1
 End Actions
 ACTIONS, Finish
 Add
 IF Supply (2) = 0
 Done (2) = TIME
 ENDIF
 End Actions
 INPUT RULE: IF Supply (2) > 0
 PULL from MCO out of WORLD
 ELSE
 Wait
 ENDIF;
 OUTPUT RULE: PUSH to BasinBuf(2);
 REPORTING: Individual;
 SHIFT: Eshift,0,0;

 END FuelRetE

 CSBCask

 NAME OF MACHINE: CSBCask;
 QUANTITY: 2;
 TYPE: Production;
 * Part type: EmpCask;
 * Production qty: 1;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None

END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: TRIANGLE (10.4,11.4,13.4,14);
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 300.0;
* Repair time: 6.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add
CHANGE mco cask to MCO
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (3) = LastMCO (3) + 1
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH EmpCask to TxToCskB,MCO to MHMTX;
REPORTING: Individual;
SHIFT: CSBCaskS,0,0;
END CSBCask
HotCond
NAME OF MACHINE: HotCond;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: HC CTime;
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Busy time;
* Down interval: 40.0;
* Repair time: 60.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Start
Add
x = RANDOM (98)
IF x < 0.8
HC_CTime = 140

ELSE
HC_CTime = 205
ENDIF
End Actions
ACTIONS, Finish
Add
PEN = 3
HCNops (1) = NOPS (HotCond(1))
HCNops (2) = NOPS (HotCond(2))
HCNops (3) = NOPS (HotCond(3))
HCNops (4) = NOPS (HotCond(4))
HCNops (5) = NOPS (HotCond(5))
HCNops (6) = NOPS (HotCond(6))
IF DESC = "LstW" OR DESC = "LstE"
Done (8) = TIME
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to MHMTX;
REPORTING: Individual;
SHIFT: DelayHC,0,0;
END HotCond
Days5E
NAME OF SHIFT: Days5E;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 2184.000000;
SHIFT DATA: SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
REPORTING: Yes;
END Days5E
onepc
NAME OF VARIABLE: onepc;
QUANTITY: 1;
REPORTING: Yes;
END onepc
totobs
NAME OF VARIABLE: totobs;
QUANTITY: 1;
REPORTING: Yes;
END totobs
CSB
NAME OF BUFFER: CSB;
QUANTITY: 1;
CAPACITY: 1000;
DELAY MODE: None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;

```

ACTIONS, In
Add
make it its second pass
PEN = 2
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END CSB

cellone

NAME OF VARIABLE: cellone;
QUANTITY: 1;
REPORTING: Yes;

END cellone

CskLoadE

NAME OF MACHINE: CskLoadE;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
    Cycle: None;
END
DISCRETE LINKS :
    Fill: None
END
DISCRETE LINKS :
    Empty: None
END
CYCLE TIME: TRIANGLE (12,16,9,26,N + 4);
BREAKDOWN DETAIL
    Breakdown number: 1
    * Mode: Available time;
    * Down interval: 35.0;
    * Repair time: 7.0;
    * Scrap part: No;
    * Description: Breakdown Number 1
    * Setup on repair: No;
    * Check at cycle start only: Yes;
    LABOR:
        Repair: None;
    END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add
CHANGE ALL to mco_cask
countmco (2) = countmco (2) + 1
IF countmco (2) = 200
    Done (4) = TIME
    DESC = "Late"
ENDIF
End Actions
INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(2)%(1),
    CaskBuf(1);
OUTPUT RULE: PUSH to TxtoCVD;
REPORTING: Individual;
SHIFT: CskLoadE,0,0;

END CskLoadE

Days5

```

```

NAME OF SHIFT: Days5;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
ACTIONS, End
Add
  IF Done (3) > 1 AND ISTATE (CskLoadW) < 3
    CskLoadW = Woff
  ENDDIF
  IF Done (4) > 1 AND ISTATE (CskLoadE) < 3
    CskLoadE = Eoff
  ENDDIF
  IF countmco (1) = 200 AND countmco (2) = 200
    TxToCVD = Eoff
  ENDDIF
  IF LastMCO (1) = 2 AND ISTATE (Vacuum(1)) < 3
    VDShift = Eoff
  ENDDIF
  IF LastMCO (2) = 2 AND ISTATE (Tx1KTo2E) < 3
    Tx1K2ES = Eoff
  ENDDIF
  IF LastMCO (3) = 2 AND ISTATE (CSBCask(1)) < 3
    CSBCaskS = Eoff
  ENDDIF
  IF LastMCO (4) = 2 AND ISTATE (Tx2CskB) < 3
    Tx2CskBS = Eoff
  ENDDIF
End Actions
SHIFT DATA: SD5_1day
  SD5_1day
  SD5_1day
  SD5_1day
  SD5_1day
  SD5_1day
REPORTING: Yes;

END Days5

Complete

NAME OF VARIABLE: Complete;
QUANTITY: 1;
REPORTING: Yes;

END Complete

Supply

NAME OF VARIABLE: Supply;
QUANTITY: 2;
REPORTING: Yes;

END Supply

TxToCVD

NAME OF MACHINE: TxToCVD;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :

```

```

Fill: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: TRIANGLE (0.1,0.25,0.5,13);
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 150.0;
* Repair time: 0.5;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add
IF countmco (1) = 200 AND countmco (2) = 200
Done (5) = TIME
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to Vacuum;
REPORTING: Individual;
SHIFT: TxToCvds,0,0;
END TxToCvds
DelayHC
NAME OF SHIFT: DelayHC;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 6552.000000;
SHIFT DATA: 168.000000,0.000000,0.000000;
REPORTING: Yes;
END DelayHC
Done
NAME OF VARIABLE: Done;
QUANTITY: 8;
REPORTING: Yes;
END Done
VdryUse
NAME OF HISTOGRAM: VdryUse;
QUANTITY: 1;
STATS RESET : Yes;
END VdryUse
CaskBuf
NAME OF BUFFER: CaskBuf;
QUANTITY: 1;
CAPACITY: 100;
DELAY MODE : None;

```

```

INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add
I RECORD NPARTS (CaskBuf) in CaskBufQ
! totobs = IHNUM (CaskBufQ)
! cellone = IHCELL (CaskBufQ,1)
! onepc = cellone / totobs
End Actions
ACTIONS, Out
Add
RECORD 9 - NPARTS (CaskBuf) in CaskBufQ
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;
END CaskBuf
EmpCask
NAME OF PART: EmpCask;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 9;
INTER ARRIVAL TIME: Undefined;
FIRST ARRIVAL AT: 0.0;
LOT SIZE: 9;
OUTPUT RULE: PUSH to CaskBuf;
PART ROUTE: None
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;
END EmpCask
mco_cask
NAME OF PART: mco_cask;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: None
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;
END mco_cask
TxToCskB
NAME OF MACHINE: TxToCskB;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: TRIANGLE (0.5,1,4,13);

```


BREAKDOWN_DETAIL

Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 3.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;

END

END BREAKDOWN_DETAIL

INPUT RULE: Wait;
 OUTPUT RULE: PUSH to CaskBuf;
 REPORTING: Individual;
 SHIFT: TxCskBS,0,0;

END TxToCskB

CaskTot

NAME OF VARIABLE: CaskTot;
 QUANTITY: 1;
 REPORTING: Yes;

END CaskTot

No_CaskW

NAME OF VARIABLE: No_CaskW;
 QUANTITY: 1;
 REPORTING: Yes;

END No_CaskW

No_CaskE

NAME OF VARIABLE: No_CaskE;
 QUANTITY: 1;
 REPORTING: Yes;

END No_CaskE

HC_CTime

NAME OF VARIABLE: HC_CTime;
 QUANTITY: 1;
 REPORTING: Yes;

END HC_CTime

x

NAME OF VARIABLE: x;
 QUANTITY: 1;
 REPORTING: Yes;

END x

CaskBufQ

NAME OF HISTOGRAM: CaskBufQ;
 QUANTITY: 1;
 STATS RESET : Yes;

END CaskBufQ

FRWest

NAME OF LABOR: FRWest;
 QUANTITY no shift: 1;
 REPORTING: Yes;

END FRWest

countmco

NAME OF VARIABLE: countmco;
 QUANTITY: 4;
 REPORTING: Yes;

END countmco

VacNOps

NAME OF VARIABLE: VacNOps;
 QUANTITY: 6;
 REPORTING: Yes;

END VacNOps

SD5_1day

NAME OF SHIFT: SD5_1day;
 TYPE OF SHIFT: sub shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 18.000000,6.000000,0.000000;
 REPORTING: Yes;

END SD5_1day

SD5We

NAME OF SHIFT: SD5We;
 TYPE OF SHIFT: sub shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: SD5_1day
 SD5_1day;
 REPORTING: Yes;

END SD5We

HCNOps

NAME OF VARIABLE: HCNOps;
 QUANTITY: 6;
 REPORTING: Yes;

END HCNOps

WRU1_Day

NAME OF SHIFT: WRU1_Day;
 TYPE OF SHIFT: sub shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;

SHIFT DATA: 2.000000,22.000000,0.000000;
REPORTING: Yes;

END WRU1_Day

WRU2_Day

NAME OF SHIFT: WRU2_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 5.000000,19.000000,0.000000;
REPORTING: Yes;

END WRU2_Day

WRU3_Day

NAME OF SHIFT: WRU3_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 8.000000,16.000000,0.000000;
REPORTING: Yes;

END WRU3_Day

WRU4_Day

NAME OF SHIFT: WRU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 11.000000,15.000000,0.000000;
REPORTING: Yes;

END WRU4_Day

WRU5_Day

NAME OF SHIFT: WRU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 14.000000,10.000000,0.000000;
REPORTING: Yes;

END WRU5_Day

WRU6_Day

NAME OF SHIFT: WRU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 17.000000,7.000000,0.000000;
REPORTING: Yes;

END WRU6_Day

WRU7_Day

NAME OF SHIFT: WRU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END WRU7_Day

ERU4_Day

NAME OF SHIFT: ERU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 3.000000,21.000000,0.000000;
REPORTING: Yes;

END ERU4_Day

ERU5_Day

NAME OF SHIFT: ERU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 9.000000,15.000000,0.000000;
REPORTING: Yes;

END ERU5_Day

ERU6_Day

NAME OF SHIFT: ERU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 15.000000,9.000000,0.000000;
REPORTING: Yes;

END ERU6_Day

ERU7_Day

NAME OF SHIFT: ERU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END ERU7_Day

ERU4_Mon

NAME OF SHIFT: ERU4_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;

END ERU7_Mon

WRU1_Mon

NAME OF SHIFT: WRU1_Mon;
TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

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WRU1_Day

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WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

WRU1_Day

REPORTING: Yes;

END WRU1_Mon

WRU2_Mon

NAME OF SHIFT: WRU2_Mon;
TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

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WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day;

REPORTING: Yes;

END WRU2_Mon

WRU3_Mon

NAME OF SHIFT: WRU3_Mon;
TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

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WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day

WRU3_Day;

REPORTING: Yes;

END WRU3_Mon

WRU4_Mon

NAME OF SHIFT: WRU4_Mon;
TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

B-186

END WRU4 Mon

[illegible]

END WRU5 Mon

REPORTING: Yes:

WRU7 Mon

REPORTING: Yes;

END WRU7_Mon
 WRetSh
 NAME OF SHIFT: WRetSh;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 ACTIONS, End
 Add
 IF TIME > 4368
 Wshift = WShRep
 IF Done (1) > 1
 Wshift = Woff
 ENDIF
 ENDIF
 End Actions
 SHIFT DATA: WRU1_Mon
 WRU2_Mon
 WRU3_Mon
 WRU4_Mon
 WRU5_Mon
 WRU6_Mon;
 REPORTING: Yes;
 END WRetSh
 ERetSh
 NAME OF SHIFT: ERetSh;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 2184.000000;
 ACTIONS, End
 Add
 IF TIME > 4368
 Eshift = EShRep
 IF Done (2) > 1
 Eshift = Eoff
 ENDIF
 ENDIF
 End Actions
 SHIFT DATA: ERU4_Mon
 ERU5_Mon
 ERU6_Mon;
 REPORTING: Yes;
 END ERetSh
 Wshift
 NAME OF VARIABLE: Wshift;
 QUANTITY: 1;
 REPORTING: Yes;
 END Wshift
 WShRep
 NAME OF SHIFT: WShRep;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;

Rest time: 0.000000;
 SHIFT DATA: WRU7_Mon;
 REPORTING: Yes;
 END WShRep
 EShRep
 NAME OF SHIFT: EShRep;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: ERU7_Mon;
 REPORTING: Yes;
 END EShRep
 EShift
 NAME OF VARIABLE: Eshift;
 QUANTITY: 1;
 REPORTING: Yes;
 END Eshift
 Eoff
 NAME OF SHIFT: Eoff;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 0.000000,168.000000,0.000000;
 REPORTING: Yes;
 END Eoff
 Woff
 NAME OF SHIFT: Woff;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 0.000000,168.000000,0.000000;
 REPORTING: Yes;
 END Woff
 Days7
 NAME OF SHIFT: Days7;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 168.000000,0.000000,0.000000;
 REPORTING: Yes;
 END Days7
 VDShift
 NAME OF VARIABLE: VDshift;
 QUANTITY: 1;

B-187

```

REPORTING: Yes;
END VDShift
CskLdWS
NAME OF VARIABLE: CskLdWS;
QUANTITY: 1;
REPORTING: Yes;
END CskLdWS
CskLdES
NAME OF VARIABLE: CskLdES;
QUANTITY: 1;
REPORTING: Yes;
END CskLdES
TxToCVDS
NAME OF VARIABLE: TxToCVDS;
QUANTITY: 1;
REPORTING: Yes;
END TxToCVDS
Tx1KZES
NAME OF VARIABLE: Tx1KZES;
QUANTITY: 1;
REPORTING: Yes;
END Tx1KZES
CSBCaskS
NAME OF VARIABLE: CSBCaskS;
QUANTITY: 1;
REPORTING: Yes;
END CSBCaskS
TxCskBS
NAME OF VARIABLE: TxCskBS;
QUANTITY: 1;
REPORTING: Yes;
END TxCskBS
LastMCO
NAME OF VARIABLE: LastMCO;
QUANTITY: 4;
REPORTING: Yes;
END LastMCO
END SELECT
END DETAIL
INITIALISE
Add

```

```

*****
!
!           Time Units are in HOURS
!
*****
IKE Basic
IKW Supply (1) = 200
    Basin
    Supply (2) = 200
    Wshift = WRetSh
    Eshift = ERetSh
    CskLdWS = Days5
    CskLdES = Days5E
    TxToCVDS = Days5
    VDShift = Days5
    Tx1KZES = Days5
    CSBCaskS = Days5
    TxCskBS = Days5
    End Actions
END INITIALISE

```

MHC-SD-SNF-RPT-011
Rev. 0

CASE 11. THREE 8HR SHIFTS/DAY, 7 DAYS/WEEK.
USING 5 HOT CONDITIONING STATIONS.

SNF Project operating 3 shifts, 7 days/week. Hot conditioning has 5 stations.

B-190

WHC-SD-SNF-RPT-011
Rev. 0

B-191

SNF Project operating 3 shifts, 7 days/week. Hot conditioning has 5 stations.

SNF Project operating 3 shifts, 7 days/week. Hot conditioning has 5 stations.

1 WITNESS MODEL: 7D18M5H
5 hot conditioning units
Base Model Name: 7 days/wk, 18 hrs/day

CLOCK
UNIT : Hours;
MULTIPLE : 1, Day, 26, 0;
MULTIPLE : 2, Week, 7, 0;
MULTIPLE : 3, 0, 0;
RATIO : 1:1;
DISPLAY : USER;
END CLOCK

DETAIL
OPTIONS
BREAKDOWN MODEL: Mean;
PKN Stream : 1;
REPAIR MODEL: Actual;
LABOR TO UNLOAD : No;
WARMUP PERIOD : 0.00;
OUTPUT INTERVAL : None;
UNBLOCK BASIS : Priority;
MONITOR STEP : Undefined;
MIXTURE STEP : Undefined;
END OPTIONS : Use local preferences;
SELECT

NAME OF MACHINE: Cskload;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END

CYCLE TIME: TRIANGLE (12,16,9,26,N + 6);
BREAKDOWN DETAIL
Breakdown number: 1
Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
ACTIONS, Finish
Add
CHANGE ALL to mco, cask
countmco (1) = countmco (1) + 1
If countmco (1) = 200

7D18M5H.LST 7-12-96 2:29p

CL-10

DESC = "LSTM"
Done (3) = TIME
END IF
End Actions

INPUT RULE: SEQUENCE /Wait MCO out of Basisbuff(1)##(1),
caskbuff(1);
OUTPUT RULE: PUSH to IxIOCD;
REPORTING: Individual;
SHIFT: Cskldms,0,0;
END Cskload
Vacuum

NAME OF MACHINE: Vacuum;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END

CYCLE TIME: TRIANGLE (74,84,113,N + 6);
BREAKDOWN DETAIL
Breakdown number: 1
Mode: Available time;
* Down interval: 40.0;
* Repair time: 40.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
ACTIONS, Finish
Add
note that its the first time through
PEN = 1
VacOps (1) = NOPS (Vacuum(1))
VacOps (2) = NOPS (Vacuum(2))
VacOps (3) = NOPS (Vacuum(3))
VacOps (4) = NOPS (Vacuum(4))
VacOps (5) = NOPS (Vacuum(5))
VacOps (6) = NOPS (Vacuum(6))
If DESC = "LSTM" OR DESC = "LSTM"
LastMCO (1) = LastMCO (1) + 1
Done (6) = TIME
END IF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: IF ISTATE (CskCask) = 1
PUSH to IxIOCD;
ELSE
Wait
END IF
REPORTING: Individual;
SHIFT: VDSHift,0,0;
END Vacuum

WHC-SD-SNF-RPT-011
Rev. 0

Page 1 of 13

CL-10

MCO

NAME OF PART: MCO;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: END
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END MCO

FuelBasQ

NAME OF HISTOGRAM: FuelBasQ;
QUANTITY: 1;
STATS RESET : Yes;

END FuelBasQ

BasinBuf

NAME OF BUFFER: BasinBuf;
QUANTITY: 2;
CAPACITY: 2;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add
I RECORD NPARTS (BasinBuf(2)) in FuelBasQ
I totobs = INHUM (FuelBasQ)
I cellone = INCELL (FuelBasQ,1)
I onepc = cellone / totobs
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END BasinBuf

FuelRetW

NAME OF MACHINE: FuelRetW;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (36,37,50,N);
BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 17.0;
* Scrap part: No;

* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:

Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Start

Add

Supply (1) = Supply (1) - 1

End Actions

ACTIONS, Finish

Add

IF Supply (1) = 0

Done (1) = TIME

ENDIF

End Actions

INPUT RULE: IF Supply (1) > 0

PULL from MCO out of WORLD

ELSE

Wait

ENDIF;

OUTPUT RULE: PUSH to BasinBuf(1);

REPORTING: Individual;

SHIFT: Wshift,0,0;

END FuelRetW

basbufpc

NAME OF VARIABLE: basbufpc;

QUANTITY: 1;

REPORTING: Yes;

END basbufpc

Tx1KtO2E

NAME OF MACHINE: Tx1KtO2E;

QUANTITY: 1;

TYPE: Single;

PRIORITY: Lowest;

LABOR:

Cycle: None;

END

DISCRETE LINKS :

Fill: None

END

DISCRETE LINKS :

Empty: None

END

CYCLE TIME: TRIANGLE (0.5,1,4,13);

BREAKDOWN DETAIL

Breakdown number: 1

* Mode: Available time;

* Down interval: 150.0;

* Repair time: 3.0;

* Scrap part: No;

* Description: Breakdown Number 1

* Setup on repair: No;

* Check at cycle start only: Yes;

LABOR:

Repair: None;

END

END BREAKDOWN DETAIL

ACTIONS, Finish

```

Add
  IF DESC = "LstW" OR DESC = "LstE"
    LastMCO (2) = LastMCO (2) + 1
    Done (7) = TIME
  ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to CSBCask;
REPORTING: Individual;
SHIFT: Tx1KZES,0,0;

END Tx1KTo2E

MHMTx

NAME OF MACHINE: MHMTx;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (3,3.25,4,15);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 150.0;
  * Repair time: 6.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
  IF PEN = 3
    Complete = Complete + 1
    IF NWIP (MCO) = 1  Iall MCO's are complete
      STOP
    ENDIF
  ENDIF
End Actions
INPUT RULE: IF ISTATE (HotCond(1)) = 0
  Wait
ELSE
  IF NPARTS (HotCond) > 4
    PULL from HotCond
  ELSE
    PULL from CSB
  ENDIF
ENDIF
OUTPUT RULE: SELECT on PEN CSB,HotCond,SHIP;
REPORTING: Individual;
SHIFT: Days5,0,0;

END MHMTx

```

```

FuelRetE

NAME OF MACHINE: FuelRetE;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: TRIANGLE (36,37,50,N);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 35.0;
  * Repair time: 17.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Start
Add
  Supply (2) = Supply (2) - 1
End Actions
ACTIONS, Finish
Add
  IF Supply (2) = 0
    Done (2) = TIME
  ENDIF
End Actions
INPUT RULE: IF Supply (2) > 0
  PULL from MCO out of WORLD
ELSE
  Wait
ENDIF;
OUTPUT RULE: PUSH to BasinBuf(2);
REPORTING: Individual;
SHIFT: Eshift,0,0;

END FuelRetE

CSBCask

NAME OF MACHINE: CSBCask;
QUANTITY: 1;
TYPE: Production;
* Part type: EmpCask;
* Production qty: 1;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None

```

END
CYCLE TIME: TRIANGLE (10.4,11.4,13.4,14);
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 300.0;
* Repair time: 6.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add
CHANGE mco cask to MCO
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (3) = LastMCO (3) + 1
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH EmpCask to TxToCskB,MCO to MHMTx;
REPORTING: Individual;
SHIFT: CSBCaskS,0,0;
END CSBCask
HotCond
NAME OF MACHINE: HotCond;
QUANTITY: 5;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: HC CTime;
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Busy time;
* Down interval: 40.0;
* Repair time: 60.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Start
Add
x = RANDOM (98)
IF x < 0.8
HC CTime = 140
ELSE
HC CTime = 205
ENDIF

End Actions
ACTIONS, Finish
Add
PEN = 3
HCNops (1) = NOPS (HotCond(1))
HCNops (2) = NOPS (HotCond(2))
HCNops (3) = NOPS (HotCond(3))
HCNops (4) = NOPS (HotCond(4))
HCNops (5) = NOPS (HotCond(5))
HCNops (6) = NOPS (HotCond(6))
IF DESC = "LstW" OR DESC = "LstE"
Done (8) = TIME
ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to MHMTx;
REPORTING: Individual;
SHIFT: DelayHC,0,0;
END HotCond
DaysSE
NAME OF SHIFT: DaysSE;
TYPE OF SHIFT: main;
OFFSET:
Working time: 0.000000;
Rest time: 2184.000000;
SHIFT DATA: SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5_1day
SD5We;
REPORTING: Yes;
END DaysSE
onepc
NAME OF VARIABLE: onepc;
QUANTITY: 1;
REPORTING: Yes;
END onepc
totobs
NAME OF VARIABLE: totobs;
QUANTITY: 1;
REPORTING: Yes;
END totobs
CSB
NAME OF BUFFER: CSB;
QUANTITY: 1;
CAPACITY: 1000;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add
I make it its second pass

PEN = 2
 End Actions
 REPORTING: Individual;
 SHIFT: Undefined,0;
 END CSB
 cellone
 NAME OF VARIABLE: cellone;
 QUANTITY: 1;
 REPORTING: Yes;
 END cellone
 CskLoadE
 NAME OF MACHINE: CskLoadE;
 QUANTITY: 1;
 TYPE: Assembly;
 * Assembly quantity: 2;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 35.0;
 * Repair time: 7.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 CHANGE ALL to mco cask
 countmco (2) = countmco (2) + 1
 IF countmco (2) = 200
 Done (4) = TIME
 DESC = "LstE"
 ENDIF
 End Actions
 INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(2)#(1),
 CaskBuf#(1);
 OUTPUT RULE: PUSH to TxToCVD;
 REPORTING: Individual;
 SHIFT: CskLDES,0,0;
 END CskLoadE
 Days5
 NAME OF SHIFT: Days5;
 TYPE OF SHIFT: main;

OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 ACTIONS, End
 Add
 IF Done (3) > 1 AND ISTATE (CskLoadM) <> 3
 CskLdMS = Woff
 ENDIF
 IF Done (4) > 1 AND ISTATE (CskLoadE) <> 3
 CskLDES = Eoff
 ENDIF
 IF countmco (1) = 200 AND countmco (2) = 200
 TxToCVD = Eoff
 ENDIF
 IF LastMCO (1) = 2 AND ISTATE (Vacuum(1)) <> 3
 VdShift = Eoff
 ENDIF
 IF LastMCO (2) = 2 AND ISTATE (Tx1KTo2E) <> 3
 Tx1K2ES = Eoff
 ENDIF
 IF LastMCO (3) = 2 AND ISTATE (CSBCask) <> 3
 CSBCaskS = Eoff
 ENDIF
 IF LastMCO (4) = 2 AND ISTATE (TxToCskB) <> 3
 TxCskBS = Eoff
 ENDIF
 End Actions
 SHIFT DATA: SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 REPORTING: Yes;
 END Days5
 Complete
 NAME OF VARIABLE: Complete;
 QUANTITY: 1;
 REPORTING: Yes;
 END Complete
 Supply
 NAME OF VARIABLE: Supply;
 QUANTITY: 2;
 REPORTING: Yes;
 END Supply
 TxToCVD
 NAME OF MACHINE: TxToCVD;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :

Empty: None
 END
 CYCLE TIME: TRIANGLE (0.1,0.25,0.5,13);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 0.5;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 IF countmco (1) = 200 AND countmco (2) = 200
 Done (5) = TIME
 ENDIF
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to Vacuum;
 REPORTING: Individual;
 SHIFT: TxToCvds,0,0;
 END TxToCvD
 DelayHC
 NAME OF SHIFT: DelayHC;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 6552.000000;
 SHIFT DATA: 168.000000,0.000000,0.000000;
 REPORTING: Yes;
 END DelayHC
 Done
 NAME OF VARIABLE: Done;
 QUANTITY: 8;
 REPORTING: Yes;
 END Done
 VDryUse
 NAME OF HISTOGRAM: VDryUse;
 QUANTITY: 1;
 STATS RESET: Yes;
 END VDryUse
 CaskBuf
 NAME OF BUFFER: CaskBuf;
 QUANTITY: 1;
 CAPACITY: 100;
 DELAY MODE: None;
 INPUT POSITION: Rear;
 OUTPUT SCAN FROM: Front;
 * Select: First;

ACTIONS, In
 Add
 !RECORD NPARTS (CaskBuf) in CaskBufQ
 !totobs = !HNUM (CaskBufQ)
 !cellone = !HCELL (CaskBufQ,1)
 !onepc = cellone / totobs
 End Actions
 ACTIONS, Out
 Add
 RECORD 9 - NPARTS (CaskBuf) in CaskBufQ
 End Actions
 REPORTING: Individual;
 SHIFT: Undefined,0;
 END CaskBuf
 EmpCask
 NAME OF PART: EmpCask;
 TYPE: Variable attributes;
 GROUP NUMBER: 1;
 MAXIMUM ARRIVALS: 9;
 INTER ARRIVAL TIME: Undefined;
 FIRST ARRIVAL AT: 0.0;
 LOT SIZE: 9;
 OUTPUT RULE: PUSH to CaskBuf;
 PART ROUTE: None
 REPORTING: Yes;
 CONTAINS FLUIDS: No;
 SHIFT: Undefined;
 END EmpCask
 mco_cask
 NAME OF PART: mco_cask;
 TYPE: Variable attributes;
 GROUP NUMBER: 1;
 MAXIMUM ARRIVALS: 0;
 OUTPUT RULE: Wait;
 PART ROUTE: None
 REPORTING: Yes;
 CONTAINS FLUIDS: No;
 SHIFT: Undefined;
 END mco_cask
 TxToCskB
 NAME OF MACHINE: TxToCskB;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (0.5,1,4,13);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;

* Down interval: 150.0;
 * Repair time: 3.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;

END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 LastMCO (4) = LastMCO (3)
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to CaskBuf;
 REPORTING: Individual;
 SHIFT: TxCSkBS,0,0;

END TxToCskB

CaskTot

NAME OF VARIABLE: CaskTot;
 QUANTITY: 1;
 REPORTING: Yes;

END CaskTot

No_CaskW

NAME OF VARIABLE: No_CaskW;
 QUANTITY: 1;
 REPORTING: Yes;

END No_CaskW

No_CaskE

NAME OF VARIABLE: No_CaskE;
 QUANTITY: 1;
 REPORTING: Yes;

END No_CaskE

HC_CTime

NAME OF VARIABLE: HC_CTime;
 QUANTITY: 1;
 REPORTING: Yes;

END HC_CTime

x

NAME OF VARIABLE: x;
 QUANTITY: 1;
 REPORTING: Yes;

END x

CaskBufQ

NAME OF HISTOGRAM: CaskBufQ;
 QUANTITY: 1;
 STATS RESET : Yes;

END CaskBufQ

FRWest

NAME OF LABOR: FRWest;
 QUANTITY no shift: 1;
 REPORTING: Yes;

END FRWest

countmco

NAME OF VARIABLE: countmco;
 QUANTITY: 4;
 REPORTING: Yes;

END countmco

VacNOps

NAME OF VARIABLE: VacNOps;
 QUANTITY: 6;
 REPORTING: Yes;

END VacNOps

SD5_1day

NAME OF SHIFT: SD5_1day;
 TYPE OF SHIFT: sub shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 18.000000,6.000000,0.000000;
 REPORTING: Yes;

END SD5_1day

SD5We

NAME OF SHIFT: SD5We;
 TYPE OF SHIFT: sub shift;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: SD5_1day
 SD5_1day;
 REPORTING: Yes;

END SD5We

HCNOps

NAME OF VARIABLE: HCNOps;
 QUANTITY: 6;
 REPORTING: Yes;

END HCNOps

WRU1_Day

NAME OF SHIFT: WRU1_Day;
 TYPE OF SHIFT: sub shift;
 OFFSET:
 Working time: 0.000000;

Rest time: 0.000000;
SHIFT DATA: 2.000000,22.000000,0.000000;
REPORTING: Yes;

END WRU1_Day

WRU2_Day

NAME OF SHIFT: WRU2_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 5.000000,19.000000,0.000000;
REPORTING: Yes;

END WRU2_Day

WRU3_Day

NAME OF SHIFT: WRU3_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 8.000000,16.000000,0.000000;
REPORTING: Yes;

END WRU3_Day

WRU4_Day

NAME OF SHIFT: WRU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 11.000000,13.000000,0.000000;
REPORTING: Yes;

END WRU4_Day

WRU5_Day

NAME OF SHIFT: WRU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 14.000000,10.000000,0.000000;
REPORTING: Yes;

END WRU5_Day

WRU6_Day

NAME OF SHIFT: WRU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 17.000000,7.000000,0.000000;
REPORTING: Yes;

END WRU6_Day

WRU7_Day

NAME OF SHIFT: WRU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END WRU7_Day

ERU4_Day

NAME OF SHIFT: ERU4_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 3.000000,21.000000,0.000000;
REPORTING: Yes;

END ERU4_Day

ERU5_Day

NAME OF SHIFT: ERU5_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 9.000000,15.000000,0.000000;
REPORTING: Yes;

END ERU5_Day

ERU6_Day

NAME OF SHIFT: ERU6_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 15.000000,9.000000,0.000000;
REPORTING: Yes;

END ERU6_Day

ERU7_Day

NAME OF SHIFT: ERU7_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END ERU7_Day

ERU4_Mon

NAME OF SHIFT: ERU4_Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;

B-201

REPORTING: Yes;

ERU5 Mon

Working time: 0.000000;
Rest time: 0.000000:

[illegible]

END ERU5 Mon

NAME OF SHIFT: ERU6 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:

[illegible]

ERU6 Day;
REPORTING: Yes;

ERU7 Mon

Working time: 0.000000;
Rest time: 0.000000:

ERU7 Day
ERU7 Day
ERU7 Day
ERU7 Day
SD5We:

REPORTING: Yes;

B-203

[illegible]

REPORTING: Yes;

END WRU4 Mon

WRUS Mon

NAME OF SHIFT: WRU5 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU5 Day

[illegible]

WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day
WRU5_Day

WRU5 Day;
REPORTING: Yes;

END WRU5 Mon

WRU6 Mon

NAME OF SHIFT: WRU6 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:

Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU6 Day

[illegible]

REPORTING: Yes;

END WRU6 Mon

WRU7 Mon

NAME OF SHIFT: WRU7 Mon;
TYPE OF SHIFT: sub shift;
OFFSET:

```
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: WRU7_Day
WRU7_Day
WRU7_Day
WRU7_Day
WRU7_Day
SD5We:
```

REPORTING: Yes;
 END WRU7_Mon
 WRetSh
 NAME OF SHIFT: WRetSh;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 ACTIONS, End
 Add
 IF TIME > 4368
 Wshift = WShRep
 IF Done (1) > 1
 Wshift = Woff
 ENDIF
 ENDIF
 End Actions
 SHIFT DATA: WRU1_Mon
 WRU2_Mon
 WRU3_Mon
 WRU4_Mon
 WRU5_Mon
 WRU6_Mon;
 REPORTING: Yes;
 END WRetSh
 ERetSh
 NAME OF SHIFT: ERetSh;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 2184.000000;
 ACTIONS, End
 Add
 IF TIME > 4368
 EShift = EShRep
 IF Done (2) > 1
 EShift = Eoff
 ENDIF
 ENDIF
 End Actions
 SHIFT DATA: ERU4_Mon
 ERU5_Mon
 ERU6_Mon;
 REPORTING: Yes;
 END ERetSh
 Wshift
 NAME OF VARIABLE: Wshift;
 QUANTITY: 1;
 REPORTING: Yes;
 END Wshift
 WShRep
 NAME OF SHIFT: WShRep;
 TYPE OF SHIFT: main;
 OFFSET:

Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: WRU7_Mon;
 REPORTING: Yes;
 END WShRep
 EShRep
 NAME OF SHIFT: EShRep;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: ERU7_Mon;
 REPORTING: Yes;
 END EShRep
 EShift
 NAME OF VARIABLE: EShift;
 QUANTITY: 1;
 REPORTING: Yes;
 END EShift
 Eoff
 NAME OF SHIFT: Eoff;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 0.000000,168.000000,0.000000;
 REPORTING: Yes;
 END Eoff
 Woff
 NAME OF SHIFT: Woff;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 0.000000,168.000000,0.000000;
 REPORTING: Yes;
 END Woff
 Days7
 NAME OF SHIFT: Days7;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 168.000000,0.000000,0.000000;
 REPORTING: Yes;
 END Days7
 VDShift
 NAME OF VARIABLE: VDShift;

[illegible]

Page 13 of 13

7D18MR5H.LST 7-12-96 2:29p

```

INITIALISE
END DETAIL
END SELECT
END LASTCMCO
NAME OF VARIABLE: LASTCMCO,
QUANTITY: 4,
REPORTING: Yes;
LASTCMCO
END TXCSKBS
NAME OF VARIABLE: TXCSKBS,
QUANTITY: 1,
REPORTING: Yes;
TXCSKBS
END CSBCKSKS
NAME OF VARIABLE: CSBCKSKS,
QUANTITY: 1,
REPORTING: Yes;
CSBCKSKS
END TXKZES
NAME OF VARIABLE: TXKZES,
QUANTITY: 1,
REPORTING: Yes;
TXKZES
END TXTCVDS
NAME OF VARIABLE: TXTCVDS,
QUANTITY: 1,
REPORTING: Yes;
TXTCVDS
END CKLDES
NAME OF VARIABLE: CKLDES,
QUANTITY: 1,
REPORTING: Yes;
CKLDES
END CKLHMS
NAME OF VARIABLE: CKLHMS,
QUANTITY: 1,
REPORTING: Yes;
CKLHMS
END VDSHFT
QUANTITY: 1,
REPORTING: Yes;

```

B-205

**CASE 12. THREE 8HR SHIFTS/DAY, 7 DAYS/WEEK.
USING 4 HOT CONDITIONING STATIONS.**

SNF Project operating 3 shifts, 7 days/week. Hot conditioning has 4 stations.

B-207

WHC-SD-SNF-RPT-011
Rev. 0

SNF Project operating 3 shifts, 7 days/week. Hot conditioning has 4 stations.

SNF Project operating 3 shifts, 7 days/week. Hot conditioning has 4 stations.

! WITNESS MODEL: 7D18HR4H

Base Model - 7 days/wk, 18 hrs/day
4 Hot Conditioning Units

CLOCK

UNIT : Hours;
MULTIPLE : 1,Day,24,0;
MULTIPLE : 2,Week,7,0;
MULTIPLE : 3,,0,0;
RATIO : 1:1;
DISPLAY : USER;
END CLOCK

DETAIL

OPTIONS

BREAKDOWN MODEL: Mean;
PRN Stream : 1;
REPAIR MODEL: Actual;
LABOR TO UNLOAD : No;
WARMUP PERIOD : 0.00;
OUTPUT INTERVAL : None;
UNBLOCK BASIS : Priority;
MONITOR STEP : Undefined;
MIXTURE STEP : Undefined;
MODULE ELEMENT NAMES : Use local preferences;
END OPTIONS

SELECT

CskLoadW

NAME OF MACHINE: CskLoadW;
QUANTITY: 1;
TYPE: Assembly;
* Assembly quantity: 2;
PRIORITY: Lowest;
LABOR:

Cycle: None;
END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (12,16,9,26,N + 4);

BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 7.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:

Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish

Add
CHANGE ALL to mco_cask
countmco (1) = countmco (1) + 1
IF countmco (1) = 200

DESC = "LstW"
Done (3) = TIME
ENDIF
End Actions
INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(1)#(1),
CskBuf#(1);
OUTPUT RULE: PUSH to TxToCVD;
REPORTING: Individual;
SHIFT: CskLdWS,0,0;

END CskLoadW

Vacuum

NAME OF MACHINE: Vacuum;
QUANTITY: 6;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;

END
DISCRETE LINKS :
Fill: None

END
DISCRETE LINKS :
Empty: None

END
CYCLE TIME: TRIANGLE (74,84,113,N + 6);

BREAKDOWN DETAIL

Breakdown number: 1
* Mode: Available time;
* Down interval: 40.0;
* Repair time: 40.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;

END
END BREAKDOWN DETAIL
ACTIONS, Finish

Add
Inote that its the first time through

PEN = 1
VacNops (1) = NOPS (Vacuum(1))
VacNops (2) = NOPS (Vacuum(2))
VacNops (3) = NOPS (Vacuum(3))
VacNops (4) = NOPS (Vacuum(4))
VacNops (5) = NOPS (Vacuum(5))
VacNops (6) = NOPS (Vacuum(6))
IF DESC = "LstW" OR DESC = "LstE"
LastMCO (1) = LastMCO (1) + 1
Done (6) = TIME
ENDIF

End Actions
INPUT RULE: Wait;
OUTPUT RULE: IF ISTATE (CSBcask) = 1
PUSH to Tx1KtoZE

ELSE
Wait
ENDIF;
REPORTING: Individual;
SHIFT: VdShift,0,0;

END Vacuum

MHC-SD-SNF-RPT-011
Rev. 0

12/24/96

```

MCO
NAME OF PART: MCO;
TYPE: Variable attributes;
GROUP NUMBER: 1;
MAXIMUM ARRIVALS: 0;
OUTPUT RULE: Wait;
PART ROUTE: END
REPORTING: Yes;
CONTAINS FLUIDS: No;
SHIFT: Undefined;

END MCO

FuelBasQ

NAME OF HISTOGRAM: FuelBasQ;
QUANTITY: 1;
STATS RESET : Yes;

END FuelBasQ

BasinBuf

NAME OF BUFFER: BasinBuf;
QUANTITY: 2;
CAPACITY: 2;
DELAY MODE : None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add
I RECORD NPARTS (BasinBuf(2)) in FuelBasQ
totobs = INNUM (FuelBasQ)
icellone = IHCCELL (FuelBasQ,1)
ionepe = cellone / totobs
End Actions
REPORTING: Individual;
SHIFT: Undefined,0;

END BasinBuf

FuelRetW

NAME OF MACHINE: FuelRetW;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: TRIANGLE (36,37,50,N);
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 35.0;
* Repair time: 17.0;
* Scrap part: No;

```

```

* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Start
Add
Supply (1) = Supply (1) - 1
End Actions
ACTIONS, Finish
Add
IF Supply (1) = 0
Done (1) = TIME
ENDIF
End Actions
INPUT RULE: IF Supply (1) > 0
PULL from MCO out of WORLD
ELSE
Wait
ENDIF;
OUTPUT RULE: PUSH to BasinBuf(1);
REPORTING: Individual;
SHIFT: Wshift,0,0;

END FuelRetW

besbufpc

NAME OF VARIABLE: besbufpc;
QUANTITY: 1;
REPORTING: Yes;

END besbufpc

Tx1KTo2E

NAME OF MACHINE: Tx1KTo2E;
QUANTITY: 1;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
Cycle: None;
END
DISCRETE LINKS :
Fill: None
END
DISCRETE LINKS :
Empty: None
END
CYCLE TIME: TRIANGLE (0.5,1,4,13);
BREAKDOWN DETAIL
Breakdown number: 1
* Mode: Available time;
* Down interval: 150.0;
* Repair time: 3.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Finish

```

Add
 IF DESC = "LstW" OR DESC = "LstE"
 LastMCO (2) = LastMCO (2) + 1
 Done (7) = TIME
 ENDIF
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to CSBCask;
 REPORTING: Individual;
 SHIFT: Tx1K2ES,0,0;
 END Tx1KTo2E
 MHMTx
 NAME OF MACHINE: MHMTx;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (3,3.25,4,15);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 6.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 IF PEN = 3
 Complete = Complete + 1
 IF MWIP (MCO) = 1 all MCO's are complete
 STOP
 ENDIF
 ENDIF
 End Actions
 INPUT RULE: IF ISTATE (HotCond(1)) = 0
 Wait
 ELSE
 IF NPARTS (HotCond) > 3
 PULL from HotCond
 ELSE
 PULL from CSB
 ENDIF
 ENDIF
 OUTPUT RULE: SELECT on PEN CSB,HotCond,SHIP;
 REPORTING: Individual;
 SHIFT: Days5,0,0;
 END MHMTx

FuelRetE
 NAME OF MACHINE: FuelRetE;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (36,37,50,N);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 35.0;
 * Repair time: 17.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Start
 Add
 Supply (2) = Supply (2) - 1
 End Actions
 ACTIONS, Finish
 Add
 IF Supply (2) = 0
 Done (2) = TIME
 ENDIF
 End Actions
 INPUT RULE: IF Supply (2) > 0
 PULL from MCO out of WORLD
 ELSE
 Wait
 ENDIF;
 OUTPUT RULE: PUSH to BasinBuf(2);
 REPORTING: Individual;
 SHIFT: EShift,0,0;
 END FuelRetE
 CSBCask
 NAME OF MACHINE: CSBCask;
 QUANTITY: 1;
 TYPE: Production;
 * Part type: EmpCask;
 * Production qty: 1;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None

MHC--SD-SNF-RPT-011
 Rev. 0

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END
CYCLE TIME: TRIANGLE (10.4,11.4,13.4,14);
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Available time;
  * Down interval: 300.0;
  * Repair time: 6.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
  LABOR:
    Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Finish
Add
  CHANGE mco cask to MCO
  IF DESC = "LstW" OR DESC = "LstE"
    LastMCO (3) = LastMCO (3) + 1
  ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH EmpCask to TxToCskB,MCO to MHMTx;
REPORTING: Individual;
SHIFT: CSBCasks,0,0;

END CSBCask

HotCond

NAME OF MACHINE: HotCond;
QUANTITY: 4;
TYPE: Single;
PRIORITY: Lowest;
LABOR:
  Cycle: None;
END
DISCRETE LINKS :
  Fill: None
END
DISCRETE LINKS :
  Empty: None
END
CYCLE TIME: HC_CTime;
BREAKDOWN_DETAIL
  Breakdown number: 1
  * Mode: Busy time;
  * Down interval: 40.0;
  * Repair time: 60.0;
  * Scrap part: No;
  * Description: Breakdown Number 1
  * Setup on repair: No;
  * Check at cycle start only: Yes;
  LABOR:
    Repair: None;
END
END BREAKDOWN_DETAIL
ACTIONS, Start
Add
  x = RANDOM (98)
  IF x < 0.8
    HC_CTime = 140
  ELSE
    HC_CTime = 205
  ENDIF

```

```

End Actions
ACTIONS, Finish
Add
  PEN = 3
  HCNops (1) = NOPS (HotCond(1))
  HCNops (2) = NOPS (HotCond(2))
  HCNops (3) = NOPS (HotCond(3))
  HCNops (4) = NOPS (HotCond(4))
  HCNops (5) = NOPS (HotCond(5))
  HCNops (6) = NOPS (HotCond(6))
  IF DESC = "LstW" OR DESC = "LstE"
    Done (8) = TIME
  ENDIF
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to MHMTx;
REPORTING: Individual;
SHIFT: DelayHC,0,0;

END HotCond

Days5E

NAME OF SHIFT: Days5E;
TYPE OF SHIFT: main;
OFFSET:
  Working time: 0.000000;
  Rest time: 2184.000000;
SHIFT DATA: SD5_1day
  SD5_1day
  SD5_1day
  SD5_1day
  SD5_1day
  SD5_1day
REPORTING: Yes;

END Days5E

onepc

NAME OF VARIABLE: onepc;
QUANTITY: 1;
REPORTING: Yes;

END onepc

totobs

NAME OF VARIABLE: totobs;
QUANTITY: 1;
REPORTING: Yes;

END totobs

CSB

NAME OF BUFFER: CSB;
QUANTITY: 1;
CAPACITY: 1000;
DELAY MODE: None;
INPUT POSITION: Rear;
OUTPUT SCAN FROM: Front;
* Select: First;
ACTIONS, In
Add
  make it its second pass

```


PEN = 2
 End Actions
 REPORTING: Individual;
 SHIFT: Undefined,0;
 END CSB
 cellone
 NAME OF VARIABLE: cellone;
 QUANTITY: 1;
 REPORTING: Yes;
 END cellone
 CskLoadE
 NAME OF MACHINE: CskLoadE;
 QUANTITY: 1;
 TYPE: Assembly;
 * Assembly quantity: 2;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (12,16.9,26,N + 4);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 35.0;
 * Repair time: 7.0;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 CHANGE ALL to mco_cask
 countmco (2) = countmco (2) + 1
 IF countmco (2) = 200
 Done (4) = TIME
 DESC = "LstE"
 ENDIF
 End Actions
 INPUT RULE: SEQUENCE /Wait MCO out of BasinBuf(2)%(1),
 CaskBuf#(1);
 OUTPUT RULE: PUSH to TxToCVD;
 REPORTING: Individual;
 SHIFT: CskLdES,0,0;
 END CskLoadE
 Days5
 NAME OF SHIFT: Days5;
 TYPE OF SHIFT: main;

OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 ACTIONS, End
 Add
 IF Done (3) > 1 AND ISTATE (CskLoadM) <> 3
 CskLdMS = Woff
 ENDIF
 IF Done (4) > 1 AND ISTATE (CskLoadE) <> 3
 CskLdES = Eoff
 ENDIF
 IF countmco (1) = 200 AND countmco (2) = 200
 TxToCVD = Eoff
 ENDIF
 IF LastMCO (1) = 2 AND ISTATE (Vacuum(1)) <> 3
 VShift = Eoff
 ENDIF
 IF LastMCO (2) = 2 AND ISTATE (Tx1Kto2E) <> 3
 Tx1K2ES = Eoff
 ENDIF
 IF LastMCO (3) = 2 AND ISTATE (CSBCask) <> 3
 CSBCaskS = Eoff
 ENDIF
 IF LastMCO (4) = 2 AND ISTATE (TxToCskB) <> 3
 TxCskBS = Eoff
 ENDIF
 End Actions
 SHIFT DATA: SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5_1day
 SD5Le;
 REPORTING: Yes;
 END Days5
 Complete
 NAME OF VARIABLE: Complete;
 QUANTITY: 1;
 REPORTING: Yes;
 END Complete
 Supply
 NAME OF VARIABLE: Supply;
 QUANTITY: 2;
 REPORTING: Yes;
 END Supply
 TxToCVD
 NAME OF MACHINE: TxToCVD;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :

Empty: None
 END
 CYCLE TIME: TRIANGLE (0.1,0.25,0.5,13);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;
 * Down interval: 150.0;
 * Repair time: 0.5;
 * Scrap part: No;
 * Description: Breakdown Number 1
 * Setup on repair: No;
 * Check at cycle start only: Yes;
 LABOR:
 Repair: None;
 END
 END BREAKDOWN DETAIL
 ACTIONS, Finish
 Add
 IF countmco (1) = 200 AND countmco (2) = 200
 Done (5) = TIME
 ENDIF
 End Actions
 INPUT RULE: Wait;
 OUTPUT RULE: PUSH to Vacuum;
 REPORTING: Individual;
 SHIFT: TxToCvds,0,0;
 END TxToCvds
 DelayHC
 NAME OF SHIFT: DelayHC;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 6552.000000;
 SHIFT DATA: 168.000000,0.000000,0.000000;
 REPORTING: Yes;
 END DelayHC
 Done
 NAME OF VARIABLE: Done;
 QUANTITY: 8;
 REPORTING: Yes;
 END Done
 VDryUse
 NAME OF HISTOGRAM: VDryUse;
 QUANTITY: 1;
 STATS RESET : Yes;
 END VDryUse
 CaskBuf
 NAME OF BUFFER: CaskBuf;
 QUANTITY: 1;
 CAPACITY: 100;
 DELAY MODE : None;
 INPUT POSITION: Rear;
 OUTPUT SCAN FROM: Front;
 * Select: First;

ACTIONS, In
 Add
 IRECORD NPARTS (CaskBuf) in CaskBufQ
 Itotobs = IHNUM (CaskBufQ)
 Icellone = INCELL (CaskBufQ,1)
 Ionepc = cellone / totobs
 End Actions
 ACTIONS, Out
 Add
 RECORD 9 - NPARTS (CaskBuf) in CaskBufQ
 End Actions
 REPORTING: Individual;
 SHIFT: Undefined,0;
 END CaskBuf
 EmpCask
 NAME OF PART: EmpCask;
 TYPE: Variable attributes;
 GROUP NUMBER: 1;
 MAXIMUM ARRIVALS: 9;
 INTER ARRIVAL TIME: Undefined;
 FIRST ARRIVAL AT: 0.0;
 LOT SIZE: 9;
 OUTPUT RULE: PUSH to CaskBuf;
 PART ROUTE: None
 REPORTING: Yes;
 CONTAINS FLUIDS: No;
 SHIFT: Undefined;
 END EmpCask
 mco_cask
 NAME OF PART: mco_cask;
 TYPE: Variable attributes;
 GROUP NUMBER: 1;
 MAXIMUM ARRIVALS: 0;
 OUTPUT RULE: Wait;
 PART ROUTE: None
 REPORTING: Yes;
 CONTAINS FLUIDS: No;
 SHIFT: Undefined;
 END mco_cask
 TxToCskB
 NAME OF MACHINE: TxToCskB;
 QUANTITY: 1;
 TYPE: Single;
 PRIORITY: Lowest;
 LABOR:
 Cycle: None;
 END
 DISCRETE LINKS :
 Fill: None
 END
 DISCRETE LINKS :
 Empty: None
 END
 CYCLE TIME: TRIANGLE (0.5,1,4,13);
 BREAKDOWN DETAIL
 Breakdown number: 1
 * Mode: Available time;

```

* Down interval: 150.0;
* Repair time: 3.0;
* Scrap part: No;
* Description: Breakdown Number 1
* Setup on repair: No;
* Check at cycle start only: Yes;
LABOR:
  Repair: None;
END
END BREAKDOWN DETAIL
ACTIONS, Finish
Add
  LastMCO (4) = LastMCO (3)
End Actions
INPUT RULE: Wait;
OUTPUT RULE: PUSH to CaskBuf;
REPORTING: Individual;
SHIFT: TxCSkBS,0,0;

END TxToCskB

CaskTot

NAME OF VARIABLE: CaskTot;
QUANTITY: 1;
REPORTING: Yes;

END CaskTot

No_CaskW

NAME OF VARIABLE: No_CaskW;
QUANTITY: 1;
REPORTING: Yes;

END No_CaskW

No_CasKE

NAME OF VARIABLE: No_CasKE;
QUANTITY: 1;
REPORTING: Yes;

END No_CasKE

HC_CTime

NAME OF VARIABLE: HC_CTime;
QUANTITY: 1;
REPORTING: Yes;

END HC_CTime

x

NAME OF VARIABLE: x;
QUANTITY: 1;
REPORTING: Yes;

END x

CaskBufQ

NAME OF HISTOGRAM: CaskBufQ;
QUANTITY: 1;
STATS RESET: Yes;

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END CaskBufQ

FRWest

NAME OF LABOR: FRWest;
QUANTITY no shift: 1;
REPORTING: Yes;

END FRWest

countmco

NAME OF VARIABLE: countmco;
QUANTITY: 4;
REPORTING: Yes;

END countmco

VacNops

NAME OF VARIABLE: VacNops;
QUANTITY: 6;
REPORTING: Yes;

END VacNops

SD5_1day

NAME OF SHIFT: SD5_1day;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
  SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END SD5_1day

SD5We

NAME OF SHIFT: SD5We;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;
  Rest time: 0.000000;
  SHIFT DATA: SD5_1day
  SD5_1day;
REPORTING: Yes;

END SD5We

HCNops

NAME OF VARIABLE: HCNops;
QUANTITY: 6;
REPORTING: Yes;

END HCNops

WRU1_Day

NAME OF SHIFT: WRU1_Day;
TYPE OF SHIFT: sub shift;
OFFSET:
  Working time: 0.000000;

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Rest time: 0.000000;
SHIFT DATA: 2.000000,22.000000,0.000000;
REPORTING: Yes;

END WRU1_Day

WRU2_Day

NAME OF SHIFT: WRU2_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 5.000000,19.000000,0.000000;
REPORTING: Yes;

END WRU2_Day

WRU3_Day

NAME OF SHIFT: WRU3_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 8.000000,16.000000,0.000000;
REPORTING: Yes;

END WRU3_Day

WRU4_Day

NAME OF SHIFT: WRU4_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 11.000000,13.000000,0.000000;
REPORTING: Yes;

END WRU4_Day

WRU5_Day

NAME OF SHIFT: WRU5_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 14.000000,10.000000,0.000000;
REPORTING: Yes;

END WRU5_Day

WRU6_Day

NAME OF SHIFT: WRU6_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 17.000000,7.000000,0.000000;
REPORTING: Yes;

END WRU6_Day

WRU7_Day

NAME OF SHIFT: WRU7_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END WRU7_Day

ERU4_Day

NAME OF SHIFT: ERU4_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 3.000000,21.000000,0.000000;
REPORTING: Yes;

END ERU4_Day

ERU5_Day

NAME OF SHIFT: ERU5_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 9.000000,15.000000,0.000000;
REPORTING: Yes;

END ERU5_Day

ERU6_Day

NAME OF SHIFT: ERU6_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 15.000000,9.000000,0.000000;
REPORTING: Yes;

END ERU6_Day

ERU7_Day

NAME OF SHIFT: ERU7_Day;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;
Rest time: 0.000000;
SHIFT DATA: 18.000000,6.000000,0.000000;
REPORTING: Yes;

END ERU7_Day

ERU4_Mon

NAME OF SHIFT: ERU4_Mon;
TYPE OF SHIFT: sub Shift;
OFFSET:
Working time: 0.000000;

B-217

Rest time: 0.000000;

SHIFT DATA: ERU4_Day

ERU4_Day

ERU4_Day

ERU4_Day

ERU4_Day

ERU4_Day

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ERU4_Day

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ERU4_Day

ERU4_Day

ERU4_Day

ERU4_Day

REPORTING: Yes;

END ERU4_Mon

ERU5_Mon

NAME OF SHIFT: ERU5_Mon;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: ERU5_Day

ERU5_Day

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ERU5_Day

ERU5_Day

ERU5_Day

REPORTING: Yes;

END ERU5_Mon

ERU6_Mon

NAME OF SHIFT: ERU6_Mon;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: ERU6_Day

ERU6_Day

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ERU6_Day

ERU6_Day

ERU6_Day

REPORTING: Yes;

END ERU6_Mon

ERU7_Mon

NAME OF SHIFT: ERU7_Mon;

TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: ERU7_Day

ERU7_Day

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ERU7_Day

SDSW;

REPORTING: Yes;

8-218

END ERU7_Mon

WRU1_Mon

NAME OF SHIFT: WRU1_Mon;
TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU1_Day

WRU1_Day

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WRU1_Day

WRU1_Day

WRU1_Day

REPORTING: Yes;

END WRU1_Mon

WRU2_Mon

NAME OF SHIFT: WRU2_Mon;
TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU2_Day

WRU2_Day

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WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

WRU2_Day

REPORTING: Yes;

END WRU2_Mon

WRU3_Mon

NAME OF SHIFT: WRU3_Mon;
TYPE OF SHIFT: sub shift;

OFFSET:

Working time: 0.000000;

Rest time: 0.000000;

SHIFT DATA: WRU3_Day

WRU3_Day

WRU3_Day

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WRU3_Day

REPORTING: Yes;

END WRU3_Mon

WRU4_Mon

NAME OF SHIFT: WRU4_Mon;

TYPE OF SHIFT: sub shift;

OFFSET:

REPORTING: Yes;
 END WRU7_Mon
 WRetSh
 NAME OF SHIFT: WRetSh;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 ACTIONS, End
 Add
 IF TIME > 4368
 Wshift = WShRep
 IF Done (1) > 1
 Wshift = Woff
 ENDIF
 ENDIF
 End Actions
 SHIFT DATA: WRU1_Mon
 WRU2_Mon
 WRU3_Mon
 WRU4_Mon
 WRU5_Mon
 WRU6_Mon;
 REPORTING: Yes;
 END WRetSh
 ERetSh
 NAME OF SHIFT: ERetSh;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 2184.000000;
 ACTIONS, End
 Add
 IF TIME > 4368
 Eshift = EShRep
 IF Done (2) > 1
 Eshift = Eoff
 ENDIF
 ENDIF
 End Actions
 SHIFT DATA: ERU4_Mon
 ERU5_Mon
 ERU6_Mon;
 REPORTING: Yes;
 END ERetSh
 Wshift
 NAME OF VARIABLE: Wshift;
 QUANTITY: 1;
 REPORTING: Yes;
 END Wshift
 WShRep
 NAME OF SHIFT: WShRep;
 TYPE OF SHIFT: main;
 OFFSET:

Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: WRU7_Mon;
 REPORTING: Yes;

END WShRep

EShRep

NAME OF SHIFT: EShRep;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: ERU7_Mon;
 REPORTING: Yes;

END EShRep

EShift

NAME OF VARIABLE: Eshift;
 QUANTITY: 1;
 REPORTING: Yes;

END EShift

Eoff

NAME OF SHIFT: Eoff;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 0.000000,168.000000,0.000000;
 REPORTING: Yes;

END Eoff

Woff

NAME OF SHIFT: Woff;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 0.000000,168.000000,0.000000;
 REPORTING: Yes;

END Woff

Days7

NAME OF SHIFT: Days7;
 TYPE OF SHIFT: main;
 OFFSET:
 Working time: 0.000000;
 Rest time: 0.000000;
 SHIFT DATA: 168.000000,0.000000,0.000000;
 REPORTING: Yes;

END Days7

VDShift

NAME OF VARIABLE: VDShift;

MHC-SD-SNF-RPT-011
 Rev. 0

B-221

QUANTITY: 1;
 REPORTING: Yes;

 END VDShift

 CskLdWS

 NAME OF VARIABLE: CskLdWS;
 QUANTITY: 1;
 REPORTING: Yes;

 END CskLdWS

 CskLdES

 NAME OF VARIABLE: CskLdES;
 QUANTITY: 1;
 REPORTING: Yes;

 END CskLdES

 TxToCVDS

 NAME OF VARIABLE: TxToCVDS;
 QUANTITY: 1;
 REPORTING: Yes;

 END TxToCVDS

 Tx1K2ES

 NAME OF VARIABLE: Tx1K2ES;
 QUANTITY: 1;
 REPORTING: Yes;

 END Tx1K2ES

 CSBCaskS

 NAME OF VARIABLE: CSBCaskS;
 QUANTITY: 1;
 REPORTING: Yes;

 END CSBCaskS

 TxCskBS

 NAME OF VARIABLE: TxCskBS;
 QUANTITY: 1;
 REPORTING: Yes;

 END TxCskBS

 LastMCO

 NAME OF VARIABLE: LastMCO;
 QUANTITY: 4;
 REPORTING: Yes;

 END LastMCO

 END SELECT

 END DETAIL

 INITIALISE

Add
 !*****
 !
 ! Time Units are in HOURS
 !*****
 !KE Basic
 Supply (1) = 200
 !KW Basin
 Supply (2) = 200
 Wshift = WRetSh
 Eshift = ERetSh
 CskLdWS = Days5
 CskLdES = Days5E
 TxToCVDS = Days5
 VDShift = Days7
 Tx1K2ES = Days5
 CSBCaskS = Days5
 TxCskBS = Days5
 End Actions
 END INITIALISE

B-222

APPENDIX C
WITNESS MODEL TRIAL RUNS

APPENDIX C

WITNESS MODEL TRIAL RUNS

While there is no record of the developer's internal testing or beta testing, the WITNESS Simulation Software has been around since 1985, and is currently in Revision 7. There are over four thousand WITNESS systems in use worldwide. It is used in many industries, including automotive, chemical, electronics, aerospace, engineering, food, paper, banking, government, and transportation. Therefore, the software can be considered well verified.

The WITNESS software used in preparing this study was further verified by having the software developer, ISTEI, run two cases of a demonstration model on their system, then having Kaiser Hanford Company run the same two cases on our system, and comparing the results. The results of these trial runs are identical and are included for information in the following pages.

Visual Interactive
Systems, Inc.

31225 Bainbridge Road
Solon, OH 44139-9921
(216) 519-1200
FAX (216) 519-1243

Memorandum

DATE: July 23, 1996
TO: Maple Lee, Kaiser
FROM: Pam Markt, Lanner Inc.
(formerly AT&T ISTEEL)
RE: WITNESS verification

I have attached reports from the ACME model which shipped with WITNESS release 7.0, as part of the DEMO subdirectory. I ran the model for 5000 time units - and for 20,000 time units, and have included reports for both of these cases.

I have also contacted the WITNESS development group in the U.K. to ask for further suggestions on verifying the operation of WITNESS software, and I will be in touch with you as soon as I hear from them.

A handwritten signature in cursive script, appearing to read "Pam".

4-C

ACME Report

Time: 5000.00

PART STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Number Entered	Number Shipped	Number Scrapped	Number Assembled	Number Rejected	W.I.P	Av. W.I.P	Av. Time
bar	460	0	404	46	0	10	10.00	98.23
block	151	0	0	140	0	11	13.63	407.88
valve	148	137	0	0	0	11	9.48	289.67
fixture	10	0	0	0	2260	10	10.00	4520.0
ROLLER	0	0	0	0	0	0	0.00	0.00
BELT	0	0	0	0	0	0	0.00	0.00

BUFFER STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Total in	Total out	Now in	Max	Min	Average Size	Av. after Delay Time	No.	Time
stock	56	46	10	10	8	9.86	795.83		
staging	167	166	1	1	0	0.69	18.72		
rework	24	24	0	2	0	0.36	68.34		
hardener	141	138	3	3	0	1.85	59.36	0.00	0.00
fixstore	44	35	9	9	7	8.52	874.94		
valvestk(1)	72	68	4	6	0	0.86	53.69		
valvestk(2)	72	70	2	9	0	4.08	256.38		

MACHINE STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Number of Ops.	%Idle	%Cycle	%Stopped	%Waiting
saw(1)	46	0.00	Busy : 6.11	Blocked : 86.32 Setup : 0.58 Down : 4.51	Setup : 0.00 Cycle : 2.48 Repair : 0.00
saw(2)	0	100.00	Busy : 0.00	Blocked : 0.00 Setup : 0.00 Down : 0.00	Setup : 0.00 Cycle : 0.00 Repair : 0.00
coater	28	7.10	Busy : 36.06	Blocked : 56.62 Setup : 0.22 Down : 0.00	Setup : 0.00 Cycle : 0.00 Repair : 0.00
inspectn(1)	165	18.34	Busy : 77.84	Blocked : 0.00	Setup : 0.00

9-C

				Setup	:	3.91	Cycle	:	0.00	
				Down	:	0.00	Repair	:	0.00	
inspectn(2)	0	100.00	Busy :	0.00	Blocked	:	0.00	Setup	:	0.00
					Setup	:	0.00	Cycle	:	0.00
					Down	:	0.00	Repair	:	0.00
inspectn(3)	0	100.00	Busy :	0.00	Blocked	:	0.00	Setup	:	0.00
					Setup	:	0.00	Cycle	:	0.00
					Down	:	0.00	Repair	:	0.00
inspectn(4)	0	100.00	Busy :	0.00	Blocked	:	0.00	Setup	:	0.00
					Setup	:	0.00	Cycle	:	0.00
					Down	:	0.00	Repair	:	0.00
load(1)	35	96.90	Busy :	3.10	Blocked	:	0.00	Setup	:	0.00
					Setup	:	0.00	Cycle	:	0.00
					Down	:	0.00	Repair	:	0.00
load(2)	0	100.00	Busy :	0.00	Blocked	:	0.00	Setup	:	0.00
					Setup	:	0.00	Cycle	:	0.00
					Down	:	0.00	Repair	:	0.00
grinder(1)	18	80.27	Busy :	15.93	Blocked	:	0.00	Setup	:	0.00
					Setup	:	0.00	Cycle	:	0.00
					Down	:	2.54	Repair	:	1.26
grinder(2)	18	79.40	Busy :	15.20	Blocked	:	0.00	Setup	:	0.00
					Setup	:	0.00	Cycle	:	0.00
					Down	:	4.19	Repair	:	1.20
upload(1)	36	96.81	Busy :	3.19	Blocked	:	0.00	Setup	:	0.00
					Setup	:	0.00	Cycle	:	0.00
					Down	:	0.00	Repair	:	0.00
upload(2)	0	100.00	Busy :	0.00	Blocked	:	0.00	Setup	:	0.00
					Setup	:	0.00	Cycle	:	0.00
					Down	:	0.00	Repair	:	0.00
cleaner(1)	137	45.45	Busy :	45.50	Blocked	:	0.00	Setup	:	0.00
					Setup	:	1.55	Cycle	:	0.00
					Down	:	6.41	Repair	:	1.10
cleaner(2)	0	100.00	Busy :	0.00	Blocked	:	0.00	Setup	:	0.00
					Setup	:	0.00	Cycle	:	0.00
					Down	:	0.00	Repair	:	0.00

CONVEYOR STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Now	Total	Av.	Av.				
	on	on	Size	Time	%Empty	%Move	%Block	%Queue
								%Down

beltcon1	3	141	2.8	89.71	3.90	5.30	90.80	0.00	0.00
ret1	0	36	0.0	3.00	97.61	2.39	0.00	0.00	0.00
ret2	0	36	0.0	3.00	97.61	2.39	0.00	0.00	0.00
ROLLCON1	0	0	0.0	0.00	100.00	0.00	0.00	0.00	0.00
BELTCON2	0	0	0.0	0.00	100.00	0.00	0.00	0.00	0.00
ROLLCON2	0	0	0.0	0.00	100.00	0.00	0.00	0.00	0.00

LABOR STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Qty	%Idle	%Busy	Start	End	Now	Pre-empted	Average Job Time
operator	1	74.12	25.88	96	96	0	5	11.45
OPERATR2	1	100.00	0.00	0	0	0	0	0.00

VARIABLE STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Indices	Value(s)
vlv_type		1
sensor		1
BUFF CAP(1)..(4)		10 1 10 10
NO_SAWS		1
SAW_CYC		1.0000
SAW_SET		1.0000
NO_OPS		1
SAW_FAIL		1.0000
SAW_REP		1.0000
CON_CYC		1.0000
LOOP		5
NO_CONS		1
COATBTCH		6
COAT_CYC		1.0000
COAT_SET		1
NO_INSPS		1
INSP_CYC		1.0000
INSP_SET		1.0000
INSP_REJ		1.0000
HARD_CAP		10
HARD_CUT		0
NO_LOAD		1

C-7

NO UNLD	1				
LOAD CYC	1.0000				
FIX CAP	10				
NO CLEAN	1				
GRINDCYC	1.0000				
GRINFALL	1				
CLEANCYC	1.0000				
C BATCH	10				
NEXTVALV	1				
C COUNT	2				
CON NAME	BELT				
op_no	4				
BUDGET	1000				
buff_new	0				
buff_min(1)..(4)	10	1	10	10	
user_int	0				
userreal	0.0000				
User nam	NONE				
TITLES	3				
TEXT	6				
PROMPT	7				
ERROR	1				
total	136				

TIMESERIES STATISTICS

REPORTED BY ON-SHIFT TIME

Timeseries	Pl	Mean	SD	Minimum Value	Maximum Value	Observations @Time n
THRU_PUT	1	96.300	21.354	1.0000	720.00	124.00 4560.0
						1 2540.0 62.000
						2 2980.0 70.000
						3 3120.0 80.000
						4 3360.0 84.000
						5 3600.0 90.000
						6 3840.0 100.00
						7 4080.0 111.00
						8 4320.0 118.00
						9 4560.0 124.00
						10 4800.0 124.00

REPORTED BY ON-SHIFT TIME

SHIFT STATISTICS

Name	On-Shift	Off-Shift	Completed Shifts
day	94.03	5.97	9

6-3

ACME Report

Time:20000.00

PART STATISTICS

Name	Number				REPORTED BY ON-SHIFT TIME			
	Entered	Shipped	Number Scrapped	Number Assembled	Number Rejected	W.I.P	Av. W.I.P	Av. Time
bar	1960	0	1753	197	0	10	9.98	99.38
block	604	0	0	592	0	12	13.88	448.61
valve	596	583	0	0	0	13	9.63	315.37
fixture	10	0	0	0	9760	10	10.00	19520
ROLLER	0	0	0	0	0	0	0.00	0.00
BELT	0	0	0	0	0	0	0.00	0.00

BUFFER STATISTICS

Name	Total				REPORTED BY ON-SHIFT TIME			
	in	out	Now in	Max	Min	Average Size	Av. after Delay	No. Time
stock	207	197	10	10	8	9.87	930.67	
staging	724	723	1	1	0	0.70	18.85	
rework	130	130	0	4	0	0.44	66.34	
hardener	592	590	2	3	0	1.82	59.86	0.00 0.00
fixstore	156	148	8	9	7	8.54	1368.8	
valvestk(1)	296	294	2	6	0	0.87	57.41	
valvestk(2)	296	290	6	10	0	4.22	278.24	

MACHINE STATISTICS

Name	Number				REPORTED BY ON-SHIFT TIME			
	of Ops.	%Idle	%Cycle		%Stopped		%Waiting	
saw(1)	197	0.00	Busy :	6.06	Blocked :	89.02	Setup :	0.00
					Setup :	0.73	Cycle :	1.82
					Down :	2.37	Repair :	0.00
saw(2)	0	100.00	Busy :	0.00	Blocked :	0.00	Setup :	0.00
					Setup :	0.00	Cycle :	0.00
					Down :	0.00	Repair :	0.00
coater	121	5.74	Busy :	36.94	Blocked :	57.01	Setup :	0.00
					Setup :	0.31	Cycle :	0.00
					Down :	0.00	Repair :	0.00
inspectn(1)	722	17.10	Busy :	78.99	Blocked :	0.00	Setup :	0.00

C-3

inspectn(2)	0	100.00	Busy :	0.00	Setup : 3.95	Cycle : 0.00
					Down : 0.00	Repair : 0.00
					Blocked : 0.00	Setup : 0.00
					Setup : 0.00	Cycle : 0.00
					Down : 0.00	Repair : 0.00
inspectn(3)	0	100.00	Busy :	0.00	Blocked : 0.00	Setup : 0.00
					Setup : 0.00	Cycle : 0.00
					Down : 0.00	Repair : 0.00
					Blocked : 0.00	Setup : 0.00
					Setup : 0.00	Cycle : 0.00
inspectn(4)	0	100.00	Busy :	0.00	Down : 0.00	Repair : 0.00
					Blocked : 0.00	Setup : 0.00
					Setup : 0.00	Cycle : 0.00
					Down : 0.00	Repair : 0.00
load(1)	148	96.97	Busy :	3.03	Blocked : 0.00	Setup : 0.00
					Setup : 0.00	Cycle : 0.00
					Down : 0.00	Repair : 0.00
					Blocked : 0.00	Setup : 0.00
					Setup : 0.00	Cycle : 0.00
load(2)	0	100.00	Busy :	0.00	Down : 0.00	Repair : 0.00
					Blocked : 0.00	Setup : 0.00
					Setup : 0.00	Cycle : 0.00
					Down : 0.00	Repair : 0.00
grinder(1)	74	81.56	Busy :	15.16	Blocked : 0.00	Setup : 0.00
					Setup : 0.00	Cycle : 0.00
					Down : 2.52	Repair : 0.76
					Blocked : 0.00	Setup : 0.00
grinder(2)	74	80.18	Busy :	15.17	Setup : 0.00	Cycle : 0.00
					Down : 3.87	Repair : 0.78
					Blocked : 0.03	Setup : 0.00
					Setup : 0.00	Cycle : 0.00
upload(1)	148	96.94	Busy :	3.03	Down : 0.00	Repair : 0.00
					Blocked : 0.00	Setup : 0.00
					Setup : 0.00	Cycle : 0.00
					Down : 0.00	Repair : 0.00
					Blocked : 0.00	Setup : 0.00
					Setup : 0.00	Cycle : 0.00
cleaner(1)	583	46.11	Busy :	44.85	Down : 6.43	Repair : 1.13
					Blocked : 0.00	Setup : 0.00
					Setup : 0.00	Cycle : 0.00
					Down : 0.00	Repair : 0.00
cleaner(2)	0	100.00	Busy :	0.00	Blocked : 0.00	Setup : 0.00
					Setup : 0.00	Cycle : 0.00
					Down : 0.00	Repair : 0.00

CONVEYOR STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Now on	Total on	Av. Size	Av. Time	%Empty	%Move	%Block	%Queue	%Down

Jul 23.96 16:53 No.037 P.10

ISTEL INC-CLEVELAND TEL No.2162922861

11-C

beltcon1	4	594	2.8	92.56	2.79	5.23	91.98	0.00	0.00
ret1	0	148	0.0	3.00	97.73	2.27	0.00	0.00	0.00
ret2	0	148	0.0	3.00	97.73	2.27	0.00	0.00	0.00
ROLLCON1	0	0	0.0	0.00	100.00	0.00	0.00	0.00	0.00
BELTCON2	0	0	0.0	0.00	100.00	0.00	0.00	0.00	0.00
ROLLCON2	0	0	0.0	0.00	100.00	0.00	0.00	0.00	0.00

LABOR STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Qty	%Idle	%Busy	Start	End	Now	Pre-empted	Average Job Time
operator	1	76.55	23.45	393	393	0	13	10.91
OPERATR2	1	100.00	0.00	0	0	0	0	0.00

VARIABLE STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Indices	Value(s)
vlv_type		1
sensor		1
BUFF CAP(1)..(4)		10 1 10 10
NO_SAWS		1
SAW_CYC		1.0000
SAW_SET		1.0000
NO_OPS		1
SAW_FAIL		1.0000
SAW_REP		1.0000
CON_CYC		1.0000
LOOP		5
NO_CONS		1
COATBTCH		6
COAT_CYC		1.0000
COAT_SET		1
NO_INSPS		1
INSP_CYC		1.0000
INSP_SET		1.0000
INSP_REJ		1.0000
HARD_CAP		10
HARD CUT		0
NO_LOAD		1

C-12

```

MC UNLD          1
LOAD CYC        1.0030
FIX CAP         10
MO CLEAN        1
GRINDCYC        1.0000
GRINFALL        1
CLEANCYC        1.0000
C BATCH        10
NEXTVALV        1
C COUNT         8
CON NAME        BELT
op_no           4
BUDGET          1000
buff_new        0
buff_min(1)..(4) 10      1      10      10
user_int        0
userReal        9.0000
user_nam        NONE
TTILES          3
TEXT            6
PROMPT          7
ERRCR           1
total           562
    
```

TIMESERIES STATISTICS

Timeseries	Pl	Mean	SD	REPORTED BY ON-SHIFT TIME			
				Minimum Value	Maximum Value	Observations n	Time Value
THRU_PWT	1	550.50	23.110	1.0000	720.00	582.00	19920
	1	17760	320.00				
	2	18000	324.00				
	3	18240	327.00				
	4	18480	342.00				
	5	18720	350.00				
	6	18960	360.00				
	7	19200	362.00				
	8	19440	364.00				
	9	19680	374.00				
	10	19920	382.00				

SHIFT STATISTICS

REPORTED BY ON-SHIFT TIME

Name	On-Shift	Off-Shift	Completed Shifts
day	93.70	6.30	40

PART STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Number Entered	Number Shipped	Number Scrapped	Number Assembled	Number Rejected	W.I.P	Av. W.I.P	Av. Time
bar	460	0	404	46	0	10	10.00	98.23
block	151	0	0	140	0	11	13.63	407.88
valve	148	137	0	0	0	11	9.48	289.67
fixture	10	0	0	0	2260	10	10.00	4520.0
ROLLER	0	0	0	0	0	0	0.00	0.00
BELT	0	0	0	0	0	0	0.00	0.00

BUFFER STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Total in	Total out	Now in	Max	Min	Average Size	Av. after Delay No.	Time
stock	56	46	10	10	8	9.86	795.83	
staging	167	166	1	1	0	0.69	18.72	
rework	24	24	0	2	0	0.36	68.34	
hardener	141	138	3	3	0	1.85	59.36	0.00 0.00
fixstore	44	35	9	9	7	8.52	874.94	
valvestk(1)	72	68	4	6	0	0.86	53.69	
valvestk(2)	72	70	2	9	0	4.08	256.38	

MACHINE STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Number of Ops.	%Idle	%Cycle	%Stopped	%Waiting
saw(1)	46	0.00	Busy : 6.11	Blocked : 86.32	Setup : 0.00
				Setup : 0.58	Cycle : 2.48
				Down : 4.51	Repair : 0.00
saw(2)	0	100.00	Busy : 0.00	Blocked : 0.00	Setup : 0.00
				Setup : 0.00	Cycle : 0.00
				Down : 0.00	Repair : 0.00
coater	28	7.10	Busy : 36.06	Blocked : 56.62	Setup : 0.00
				Setup : 0.22	Cycle : 0.00
				Down : 0.00	Repair : 0.00
inspectn(1)	165	18.34	Busy : 77.84	Blocked : 0.00	Setup : 0.00
				Setup : 3.91	Cycle : 0.00
				Down : 0.00	Repair : 0.00
inspectn(2)	0	100.00	Busy : 0.00	Blocked : 0.00	Setup : 0.00
				Setup : 0.00	Cycle : 0.00
				Down : 0.00	Repair : 0.00
inspectn(3)	0	100.00	Busy : 0.00	Blocked : 0.00	Setup : 0.00
				Setup : 0.00	Cycle : 0.00
				Down : 0.00	Repair : 0.00
inspectn(4)	0	100.00	Busy : 0.00	Blocked : 0.00	Setup : 0.00

				Setup	:	0.00	Cycle	:	0.00
				Down	:	0.00	Repair	:	0.00
load(1)	35	96.90	Busy : 3.10	Blocked	:	0.00	Setup	:	0.00
				Setup	:	0.00	Cycle	:	0.00
				Down	:	0.00	Repair	:	0.00
load(2)	0	100.00	Busy : 0.00	Blocked	:	0.00	Setup	:	0.00
				Setup	:	0.00	Cycle	:	0.00
				Down	:	0.00	Repair	:	0.00
grinder(1)	18	80.27	Busy : 15.93	Blocked	:	0.00	Setup	:	0.00
				Setup	:	0.00	Cycle	:	0.00
				Down	:	2.54	Repair	:	1.26
grinder(2)	18	79.40	Busy : 15.20	Blocked	:	0.00	Setup	:	0.00
				Setup	:	0.00	Cycle	:	0.00
				Down	:	4.19	Repair	:	1.20
upload(1)	36	96.81	Busy : 3.19	Blocked	:	0.00	Setup	:	0.00
				Setup	:	0.00	Cycle	:	0.00
				Down	:	0.00	Repair	:	0.00
upload(2)	0	100.00	Busy : 0.00	Blocked	:	0.00	Setup	:	0.00
				Setup	:	0.00	Cycle	:	0.00
				Down	:	0.00	Repair	:	0.00
cleaner(1)	137	45.45	Busy : 45.50	Blocked	:	0.00	Setup	:	0.00
				Setup	:	1.55	Cycle	:	0.00
				Down	:	6.41	Repair	:	1.10
cleaner(2)	0	100.00	Busy : 0.00	Blocked	:	0.00	Setup	:	0.00
				Setup	:	0.00	Cycle	:	0.00
				Down	:	0.00	Repair	:	0.00

CONVEYOR STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Now	Total	Av.	Av.					
	on	on	Size	Time	%Empty	%Move	%Block	%Queue	%Down
beltcon1	3	141	2.8	89.71	3.90	5.30	90.80	0.00	0.00
ret1	0	36	0.0	3.00	97.61	2.39	0.00	0.00	0.00
ret2	0	36	0.0	3.00	97.61	2.39	0.00	0.00	0.00
ROLLCON1	0	0	0.0	0.00	100.00	0.00	0.00	0.00	0.00
BELTCON2	0	0	0.0	0.00	100.00	0.00	0.00	0.00	0.00
ROLLCON2	0	0	0.0	0.00	100.00	0.00	0.00	0.00	0.00

LABOR STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Qty	%Idle	%Busy	<-----Number of jobs----->			<---Job Time--->	
				Start	End	Now	Pre-empted	Average
operator	1	74.12	25.88	96	96	0	5	11.46
OPERATR2	1	100.00	0.00	0	0	0	0	0.00

VARIABLE STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Indices	<----- Value(s) ----->

vlv_type	1			
sensor	1			
BUFF_CAP(1)..(4)	10	1	10	10
NO_SAWS	1			
SAW_CYC	1.0000			
SAW_SET	1.0000			
NO_OPS	1			
SAW_FAIL	1.0000			
SAW_REP	1.0000			
CON_CYC	1.0000			
LOOP	5			
NO_CONS	1			
COATBTCH	6			
COAT_CYC	1.0000			
COAT_SET	1			
NO_INSPS	1			
INSP_CYC	1.0000			
INSP_SET	1.0000			
INSP_REJ	1.0000			
HARD_CAP	10			
HARD_CUT	0			
NO_LOAD	1			
NO_UNLD	1			
LOAD_CYC	1.0000			
FIX_CAP	10			
NO_CLEAN	1			
GRINDCYC	1.0000			
GRINFALL	1			
CLEANCYC	1.0000			
C_BATCH	10			
NEXTVALV	1			
C_COUNT	2			
CON_NAME	BELT			
op_no	4			
BUDGET	1000			
buff_new	0			
buff_min(1)..(4)	10	1	10	10
user_int	0			
userreal	0.0000			
user_nam	NONE			
TITLES	3			
TEXT	6			
PROMPT	7			
ERROR	1			
total	136			

TIMESERIES STATISTICS

REPORTED BY ON-SHIFT TIME

Timeseries	Pl	Mean	SD	Minimum	Maximum	Observations
			Value	@Time	Value	@Time n Time Value

THRU_PUT 1 96.300 21.354 1.0000 720.00 124.00 4560.0

1 2640.0 62.000
2 2880.0 70.000
3 3120.0 80.000
4 3360.0 84.000
5 3600.0 90.000
6 3840.0 100.00
7 4080.0 111.00
8 4320.0 118.00
9 4560.0 124.00
10 4800.0 124.00

SHIFT STATISTICS

REPORTED BY ON-SHIFT TIME

Name	On-Shift	Off-Shift	Completed Shifts

day	94.03	5.97	9

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PART STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Number Entered	Number Shipped	Number Scrapped	Number Assembled	Number Rejected	W.I.P	Av. W.I.P	Av. Time
bar	1960	0	1753	197	0	10	9.98	99.38
block	604	0	0	592	0	12	13.88	448.61
valve	596	583	0	0	0	13	9.63	315.37
fixture	10	0	0	0	9760	10	10.00	19520
ROLLER	0	0	0	0	0	0	0.00	0.00
BELT	0	0	0	0	0	0	0.00	0.00

BUFFER STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Total in	Total out	Now in	Max	Min	Average Size	Av. after Delay Time	No.	Time
stock	207	197	10	10	8	9.87	930.67		
staging	724	723	1	1	0	0.70	18.85		
rework	130	130	0	4	0	0.44	66.34		
hardener	592	590	2	3	0	1.82	59.86	0.00	0.00
fixstore	156	148	8	9	7	8.54	1068.8		
valvestk(1)	296	294	2	6	0	0.87	57.41		
valvestk(2)	296	290	6	10	0	4.22	278.24		

MACHINE STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Number of Ops.	%Idle	%Cycle	%Stopped	%Waiting
saw(1)	197	0.00	Busy : 6.06	Blocked : 89.02	Setup : 0.00
				Setup : 0.73	Cycle : 1.82
				Down : 2.37	Repair : 0.00
saw(2)	0	100.00	Busy : 0.00	Blocked : 0.00	Setup : 0.00
				Setup : 0.00	Cycle : 0.00
				Down : 0.00	Repair : 0.00
coater	121	5.74	Busy : 36.94	Blocked : 57.01	Setup : 0.00
				Setup : 0.31	Cycle : 0.00
				Down : 0.00	Repair : 0.00
inspectn(1)	722	17.10	Busy : 78.99	Blocked : 0.00	Setup : 0.00
				Setup : 3.95	Cycle : 0.00
				Down : 0.00	Repair : 0.00
inspectn(2)	0	100.00	Busy : 0.00	Blocked : 0.00	Setup : 0.00
				Setup : 0.00	Cycle : 0.00
				Down : 0.00	Repair : 0.00
inspectn(3)	0	100.00	Busy : 0.00	Blocked : 0.00	Setup : 0.00
				Setup : 0.00	Cycle : 0.00
				Down : 0.00	Repair : 0.00
inspectn(4)	0	100.00	Busy : 0.00	Blocked : 0.00	Setup : 0.00

				Setup	: 0.00	Cycle	: 0.00
				Down	: 0.00	Repair	: 0.00
load(1)	148	96.97	Busy : 3.03	Blocked	: 0.00	Setup	: 0.00
				Setup	: 0.00	Cycle	: 0.00
				Down	: 0.00	Repair	: 0.00
load(2)	0	100.00	Busy : 0.00	Blocked	: 0.00	Setup	: 0.00
				Setup	: 0.00	Cycle	: 0.00
				Down	: 0.00	Repair	: 0.00
grinder(1)	74	81.56	Busy : 15.16	Blocked	: 0.00	Setup	: 0.00
				Setup	: 0.00	Cycle	: 0.00
				Down	: 2.52	Repair	: 0.76
grinder(2)	74	80.18	Busy : 15.17	Blocked	: 0.00	Setup	: 0.00
				Setup	: 0.00	Cycle	: 0.00
				Down	: 3.87	Repair	: 0.78
upload(1)	148	96.94	Busy : 3.03	Blocked	: 0.03	Setup	: 0.00
				Setup	: 0.00	Cycle	: 0.00
				Down	: 0.00	Repair	: 0.00
upload(2)	0	100.00	Busy : 0.00	Blocked	: 0.00	Setup	: 0.00
				Setup	: 0.00	Cycle	: 0.00
				Down	: 0.00	Repair	: 0.00
cleaner(1)	583	46.11	Busy : 44.85	Blocked	: 0.00	Setup	: 0.00
				Setup	: 1.49	Cycle	: 0.00
				Down	: 6.43	Repair	: 1.13
cleaner(2)	0	100.00	Busy : 0.00	Blocked	: 0.00	Setup	: 0.00
				Setup	: 0.00	Cycle	: 0.00
				Down	: 0.00	Repair	: 0.00

CONVEYOR STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Now	Total	Av.	Av.					
	on	on	Size	Time	%Empty	%Move	%Block	%Queue	%Down
beltcon1	4	594	2.8	92.56	2.79	5.23	91.98	0.00	0.00
ret1	0	148	0.0	3.00	97.73	2.27	0.00	0.00	0.00
ret2	0	148	0.0	3.00	97.73	2.27	0.00	0.00	0.00
ROLLCON1	0	0	0.0	0.00	100.00	0.00	0.00	0.00	0.00
BELTCON2	0	0	0.0	0.00	100.00	0.00	0.00	0.00	0.00
ROLLCON2	0	0	0.0	0.00	100.00	0.00	0.00	0.00	0.00

LABOR STATISTICS

REPORTED BY ON-SHIFT TIME

					<-----Number of jobs----->		<----Job Time---->	
Name	Qty	%Idle	%Busy	Start	End	Now	Pre-empted	Average Job Time
operator	1	76.55	23.45	393	393	0	13	10.91
OPERATR2	1	100.00	0.00	0	0	0	0	0.00

VARIABLE STATISTICS

REPORTED BY ON-SHIFT TIME

Name	Indices	<----- Value(s) ----->

vlv_type	1			
sensor	1			
BUFF_CAP(1)..(4)	10	1	10	10
NO_SAWS	1			
SAW_CYC	1.0000			
SAW_SET	1.0000			
NO_OPS	1			
SAW_FAIL	1.0000			
SAW_REP	1.0000			
CON_CYC	1.0000			
LOOP	5			
NO_CONS	1			
COATBTCH	6			
COAT_CYC	1.0000			
COAT_SET	1			
NO_INSPS	1			
INSP_CYC	1.0000			
INSP_SET	1.0000			
INSP_REJ	1.0000			
HARD_CAP	10			
HARD_CUT	0			
NO_LOAD	1			
NO_UNLD	1			
LOAD_CYC	1.0000			
FIX_CAP	10			
NO_CLEAN	1			
GRINDCYC	1.0000			
GRINFALL	1			
CLEANCYC	1.0000			
C_BATCH	10			
NEXTVALV	1			
C_COUNT	8			
CON_NAME	BELT			
op_no	4			
BUDGET	1000			
buff_new	0			
buff_min(1)..(4)	10	1	10	10
user_int	0			
userreal	0.0000			
user_nam	NONE			
TITLES	3			
TEXT	6			
PROMPT	7			
ERROR	1			
total	582			

TIMESERIES STATISTICS

REPORTED BY ON-SHIFT TIME

Timeseries	Pl	Mean	SD	Minimum	@Time	Maximum	@Time	n	Observations	Time	Value
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THRU_PUT	1	550.50	20.510	1.0000	720.00	582.00	19920			
	1	17760	520.00							
	2	18000	524.00							
	3	18240	527.00							
	4	18480	542.00							
	5	18720	550.00							
	6	18960	560.00							
	7	19200	562.00							
	8	19440	564.00							
	9	19680	574.00							
	10	19920	582.00							

SHIFT STATISTICS

REPORTED BY ON-SHIFT TIME

Name	On-Shift	Off-Shift	Completed Shifts
day	93.70	6.30	40

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	Process Engineering	Date 9/5/96
Project Title/Work Order		EDT No. 616135
Spent Nuclear Fuel Project Design Basis Capacity Study		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
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w/o Appendix

G. D. Bazinet	H5-27		X		
K. H. Bergsman	R3-48		X		
B. S. Carlisle	R3-85		X		
K. J. Cleveland	S0-04	X			
R. G. Cowan	R3-86		X		
G. E. Culley	R3-86		X		
B. L. Debban	R3-85		X		
D. R. Duncan	R3-86		X		
J. R. Frederickson	R3-86		X		
W. D. Gallo	R3-85		X		
E. W. Gerber	R3-86		X		
L. H. Goldmann	R3-86		X		
J. J. Irwin	R3-85		X		
A. T. Kee	R3-86		X		
M. L. Lee	H5-70		X		
C. R. Miska	R3-86		X		
J. E. Orchard	E6-21		X		
A. L. Pajunen	R3-86	X			
E. J. Shen	R3-86		X		
K. E. Smith	R3-85		X		
J. A. Swenson	R3-11		X		
C. A. Thompson	R3-85		X		
J. B. Truitt	S0-04		X		
T. L. Yount	R3-85		X		
SNF Project File	R3-11	X			

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To	From	Page 1 of 1
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w/o Appendix

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J. R. Frederickson	R3-86		X		
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C. A. Thompson	R3-85		X		
J. B. Truitt	S0-04		X		
T. L. Yount	R3-85		X		

SNF Project File	R3-11	X			
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