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PROCESS CENTRIFUGE OPERATING PROBLEMS AND EQUIPMENT FAILURES IN CANYON REPROCESSING FACILITIES AT THE SAVANNAH RIVER SITE (U)

MARCH 1990

Westinghouse Savannah River Company
Savannah River Site
Aiken, SC 29808

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PROCESS CENTRIFUGE OPERATING PROBLEMS AND EQUIPMENT FAILURES IN CANYON REPROCESSING FACILITIES AT THE SAVANNAH RIVER SITE (U)

By

W. S. Durant
D. F. Baughman

Approved by

O. M. Ebra-Lima, Manager
Nuclear Processes Safety Research

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ABSTRACT

A compilation of operating problems and equipment failures associated with the process centrifuges in the Savannah River Site canyon fuel reprocessing facilities is presented. These data have been collected over the 33 year operation of the facility. An analysis of the failure rates of the centrifuges is also presented. A brief description of the centrifuges and the data bank from which the information was sorted is also included.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

PROCESS CENTRIFUGE OPERATING PROBLEMS AND EQUIPMENT FAILURES IN CANYON REPROCESSING FACILITIES AT THE SAVANNAH RIVER SITE (U)

INTRODUCTION

The Savannah River Laboratory (SRL) maintains a compilation of operating problems and equipment failures that have occurred in the fuel reprocessing areas of the Savannah River Site (SRS). At present, the data bank contains more than 230,000 entries ranging from minor equipment malfunctions to incidents with the potential for injury or contamination of personnel, or for economic loss. The data bank has been used extensively for a wide variety of purposes, such as failure analyses, trend analyses, and preparation of safety analyses. Typical of the data are problems associated with the canyon process centrifuges. This report contains a compilation of the centrifuge operating problems and equipment failures primarily as an aid to organizations with related equipment. Publication of these data was prompted by a number of requests for this information by other Department of Energy (DOE) sites.

REPROCESSING AREA DATA BANK

In 1973, SRL personnel began a computerized compilation of incidents that had occurred in the reprocessing facilities of SRS.[1-5] At present, the data bank contains more than 230,000 entries. The vast majority of these incidents are minor equipment malfunctions such as leaks, instrument failures, line pluggage, and localized contamination. A few, such as fires and major equipment failures, are significant from the point of potential economic loss or injury to personnel if other unlikely events were also to have happened. However, at no time have the operating problems or equipment failures listed in this report resulted in serious injury to operating personnel.

Each of the entries is coded so that it can be retrieved based on a wide variety of specifications, including the site location, facility, unit operation, key word, date, and source document. In addition, further selectivity may be applied by combining specific key words ("and" logic) or by excluding specific key words ("not" logic). Data are presented either to a CRT terminal or as hard copy.

Data are obtained from many sources , such as incident reports, progress reports, maintenance records, service department files, and shift turnover log books. A complete list of these sources is shown in Table 1. Maintenance of the data bank requires one technical person plus clerical support. Data are normally abstracted onto a personal computer and then transferred by computer into the mainframe computer system where data are stored on a disk with magnetic tape backup. The data bank is both write and read protected to prevent unauthorized use or modifications of the stored data.

M9001059

TABLE 1. Sources Of Information In The 200-Area Fault Tree Data Bank

SOURCE	SOURCE CODE	FROM	TO
Operating Incident Report (OI)	01	1960	1988
Unusual Incident Report (UI)	02	1955	1988
Special Hazards Investigation (SHI)	03	1954	1988
Daily Teletype	04	1954	1988
Criticality Audit	05	1959	1988
Separations Department Monthly Report	06	1977	1988
Works Technical Monthly Report	07	1954	1988
Fire Department Records	08	1955	1987
Salvage Yard Receipt Records	09	1975	1979
Health Protection Monthly Report	10	1959	1987
Private Communication	11	1956	1978
Equipment Histories (Selected)	12	1955	1988
TID Accident Summary (Selected)	14	1953	1960
Undocumented RBOF Monthly Report	15	1962	1984
RBOF Unusual Incidents	18	1970	1975
Radiation Control Monthly Report	19	1962	1983
Works Engineering Monthly Report	20	1956	1984
Patrol Monthly Report	21	1963	1984
Power Department Unusual Incident Report	22	1957	1988
Waste Management Incident Report (WMI)	23	1979	1987
Waste Management Monthly Report	24	1970	1987
T&T UTs and Monthly Report	25	1957	1983
Power Department Weekly Report	26	1953	1975
Separations Incident Report (SI)	27	1976	1988
Health Protection Log Book - 772-F	28	1970	1987
Health Protection Log Book - H Canyon	28	1976	1986
Health Protection Log Book - F Canyon	28	1974	1988
Health Protection Log Book - FB-Line	28	1976	1987
Health Protection Log Book - HB-Line	28	1976	1987
Health Protection Log Book - Np Billet Line	28	1973	1984
Health Protection Log Book - Waste Tank Farm	28	1974	1987
Health Protection Log Book - Burial Ground	29	1960	1985
Laboratories Dept. Incident Report (LDI)	30	1975	1988
MIAC Records (Selected)	31	1975	1984
H Canyon Senior Supervisor Log Book	32	1977	1988
F Canyon Senior Supervisor Log Book	32	1975	1988
F Canyon Crane Log Book	33	1975	1988
FB-Line Daily Report	34	1979	1988
H Canyon Decon and Maintenance Log Book	35	1975	1984
FB-Line Recovery Shift Log Book	36	1976	1986

TABLE 1. Sources Of Information In The 200-Area Fault Tree Data Bank (Continued)

SOURCE	SOURCE CODE	FROM	TO
HB-Line Daily Report	37	1976	1988
NSF Data (Selected)	38	1966	1973
Idaho Data (Selected)	39	1972	1978
Np Target Fab. Facil. Senior Supv. Log Book	40	1975	1985
Waste Tank Farms Senior Supv. Log Book	41	1976	1987
MPPF Daily Report	42	1978	1983
MPPF Manipulator Log Book	43	1972	1980
MPPF Shift Log Book	44	1978	1981
RBOF Shift Log Book	45	1977	1986
RBOF Daily Report	46	1976	1986
Waste Tank Annulus Alarm Report	47	1981	1984
Waste Management Technology Monthly Report	48	1981	1987
PuFF Senior Supervisor Log Book	49	1979	1983
Burial Ground Waste Management Log	50	1972	1985
Special Incident Report	51	1954	1983
221-F Canyon & Outside Facil. Monthly Report	52	1982	1988
Power Technology Monthly Report	53	1977	1983
221-F Building Log	55	1977	1987
HB-Line Scrap Recovery Log	57	1978	1987
A-Line-Outside Facilities Shift Log	61	1969	1984
Health Protection Exposure Records	61	1969	1984
Unusual Occurrence Report	62	1983	1988
Environmental Control Monthly Report	63	----	----
SRP Environment Weekly Report	64	1983	1988
RHYTHM Report	65	1983	1983
A-Line/Outside Facilities Daily Log	66	1979	1988
Area Metallurgical Report	67	1954	1988
Safety Department Records	68	1983	1988
221-211-H Morning Report	69	1984	1988
Main Line Shift Log, FB-Line	70	1983	1986
772-F Laboratories Shift Log	71	1983	1988
FB-Line Seniors Log Book	72	1984	1986
FB-Line Construction Shutdown Log	73	1986	1986
FB-Line Team Monthly Summary	74	1986	1988
FB-Line Special Recovery Shift Log	75	1985	1986
Non-Conformance Report	76	1984	1988
FB-Line Nuclear Safety Inspection Highlights	77	1987	1988
HB-Line Surveillance Log Book	78	1984	1987

These data have been applied to a wide range of applications by SRS organizations. Typically, the data have been used in preparing safety analysis reports, trend analyses, and failure rate data. A complete listing of applications is shown in Table 2.

TABLE 2. Applications Of The Reprocessing Area Data Bank

- Failure rate data
- Equipment breakdown histories
- Generic incident histories
- Data for systems analyses and safety analysis reports
- Dates of specific incidents
- Consequences of incidents
- Data for design studies
- Data for quality assurance studies
- Trend analyses
- Data for project justification
- Training
- Process problem solving
- Management decision data
- Studies of effectiveness of administrative controls
- Incident audit
- Data for reliability studies
- References to source documents

A number of requests for information have been received from other DOE sites over the past several years. In response to these requests, data for selected operations are being published. The first of a planned series of reports was published in 1984 and concerned evaporation operations in the H-Area reprocessing facilities.[6] The second was published in 1985 and concerned manipulator operations.[7] The third was published in 1986 and presented data on the hot canyon crane in the F-Area reprocessing facilities.[8] The fourth, in 1987, contained data on process pumps.[9] The fifth, in 1988, contained data on process agitators.[10] This report is the sixth in the planned series. A brief description of the canyon process centrifuges follows.

CENTRIFUGE DESCRIPTION

Centrifuges are used at the nuclear fuels reprocessing plants at SRS to aid in decontamination and clarification of dissolved fuel solutions prior to separation of product and waste materials by solvent extraction.

Construction and operation details of the centrifuge are shown in Figure 1. Each centrifuge is 40 inches in diameter and has a total dynamic volume of 60 gallons. The assembly is mounted on an "A" frame which is bolted to a reinforced concrete inertia block weighing approximately 40 tons. The bowl is suspended by a single shaft on an upper bearing assembly and is driven by a 40/10 hp motor. This assembly is made up of an encasement holding the suspending ball bearing near the top of the shaft and a roller bearing located further down the shaft.

The bowl is divided into four horizontal compartments by three 6-inch-wide ring baffles, each containing a series of holes to permit vertical liquid flow. The lip of the bowl is 5-1/2 inches wide

and has no holes. The stationary compartment around the bowl is fitted on top with eight sleeves which are positioned to provide proper placement of dip tubes remotely inserted through the sleeves and into the bowl space. Two of these sleeves provide access for feed dip legs, two for remote sprays, two for permanent sprays, one for a liquid level dip leg, and one for a jet dip leg.

The feed enters through nozzles near the bottom center of the bowl, and the clarified solution overflows from the bowl to the centrifuge casing and discharges by gravity to the centrifuge run tank. Located in the bowl at the top compartment level are two skimmers which are turned slowly by an electric mechanism toward the outside of the upper compartment. As the nozzle enters the path of the rotating solution, the centrifugal velocity of the solution forces the solution through the skimmer pipe to the centrifuge casing. As solution is skimmed out of the upper compartment, solution in the lower compartment flows upward through holes in the baffles enabling the entire bowl to be skimmed. Two spray pipes are used to break up and wash cake. One spray pipe extends to the bottom of the bowl and has four spray nozzles that direct spray into the lower compartment. The other spray pipe has twelve nozzles arranged so that four nozzles spray each of the upper three compartments. The centrifuge spray pumps are triplex, single-acting power pumps that develop the required spray pressure of 600 psig. Each centrifuge is equipped with a transfer jet to transfer cake slurry and bowl rinses to the high-activity waste tank where the cakes are neutralized with sodium hydroxide before being transferred to the waste tank farm.

There are two styles of centrifuges used at SRS; the original Byrd and a newer Robatel. The units are essentially the same in operating function with the primary difference being in the mounting frame. Table 3 lists the units that are or have been used at SRS. The EP numbers may be crossed referenced to those found in the data bank sorts in this report.

TABLE 3. Process Centrifuges At The Savannah River Site

EP #	STYLE
420.1-1F	Byrd
420.1-2F	Byrd
420.1-1H	Byrd
420.1-2H	Byrd
420.1-1(M)	Byrd
420.1-2(M)	Byrd
420.1-1	Byrd
420.1-2	Byrd
420.1-3	Byrd
420.1-4	Byrd
420.1-5	Robatel
420.1-6	Robatel

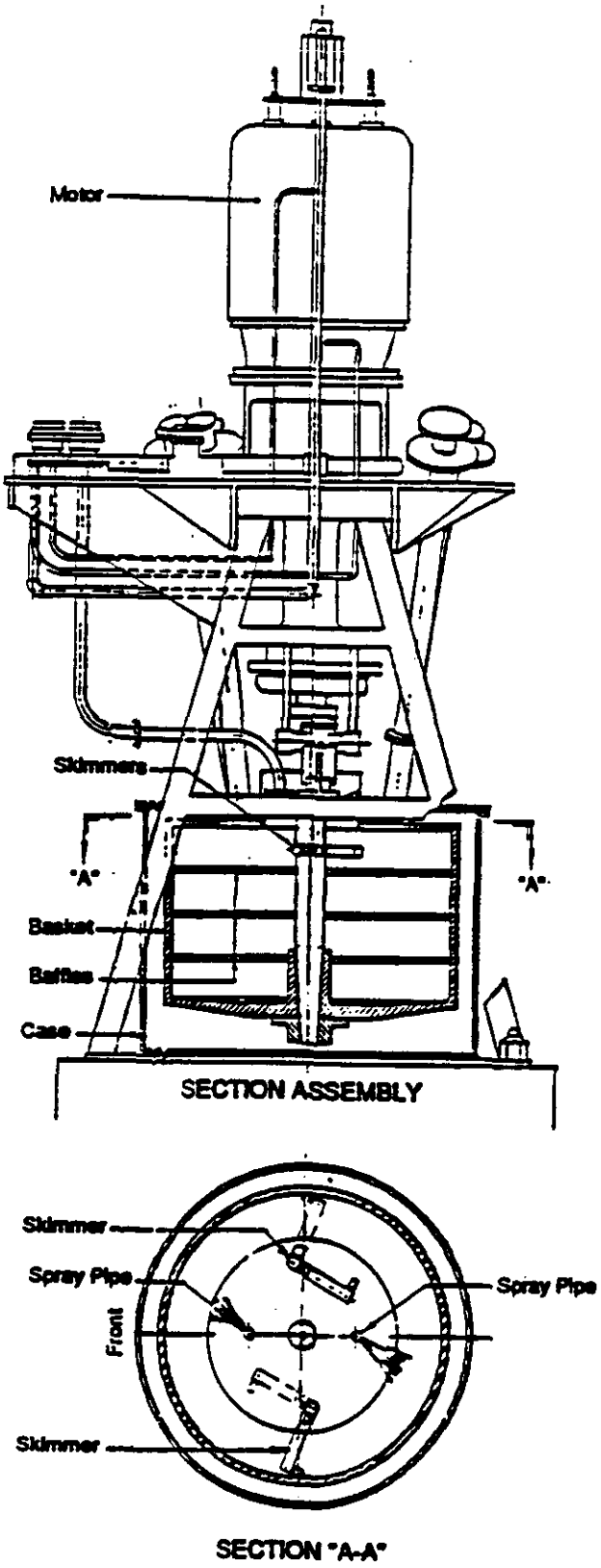

FIGURE 1. Process Centrifuge

ANALYSIS OF CENTRIFUGE FAILURE RATES

Information contained in the data bank was analyzed to determine failure characteristics for the canyon centrifuges. Only failures that required removal and major maintenance to the units were considered. Minor electrical or instrumentation problems that could be repaired without removal of the units were discounted.

Individual units have been used in the canyons since 1954. Of these, two have never experienced a major failure; the remainder have failed one or more times. Failed units are either repaired and returned to service, or are retired from service. A total of 26 major failures had occurred by the end of 1988, two units were in active service. Table 4 shows the days to failure and Table 5 shows the suspensions; that is, the days that the active units have operated since their last major repair (or since installation if no failures have occurred). Weibull analysis techniques were used to determine characteristic life of the canyon centrifuges.[11] These techniques enable a prediction from populations in which a significant number of the units have not experienced failure. As shown in Figure 2, the characteristic life is calculated to be 1244 days.

TABLE 4. Days To Failure For Canyon Centrifuges (Refer to Figure 2)

2	851
10	882
94	943
113	973
116	1520
182	1581
243	1794
425	1885
485	2098
486	2372
699	2433
760	2920
760	3802

TABLE 5. Days Since Last Failure For Canyon Centrifuges Or Days Since Installation For Units That Have Not Failed (Refer to Figure 2)

730	1277

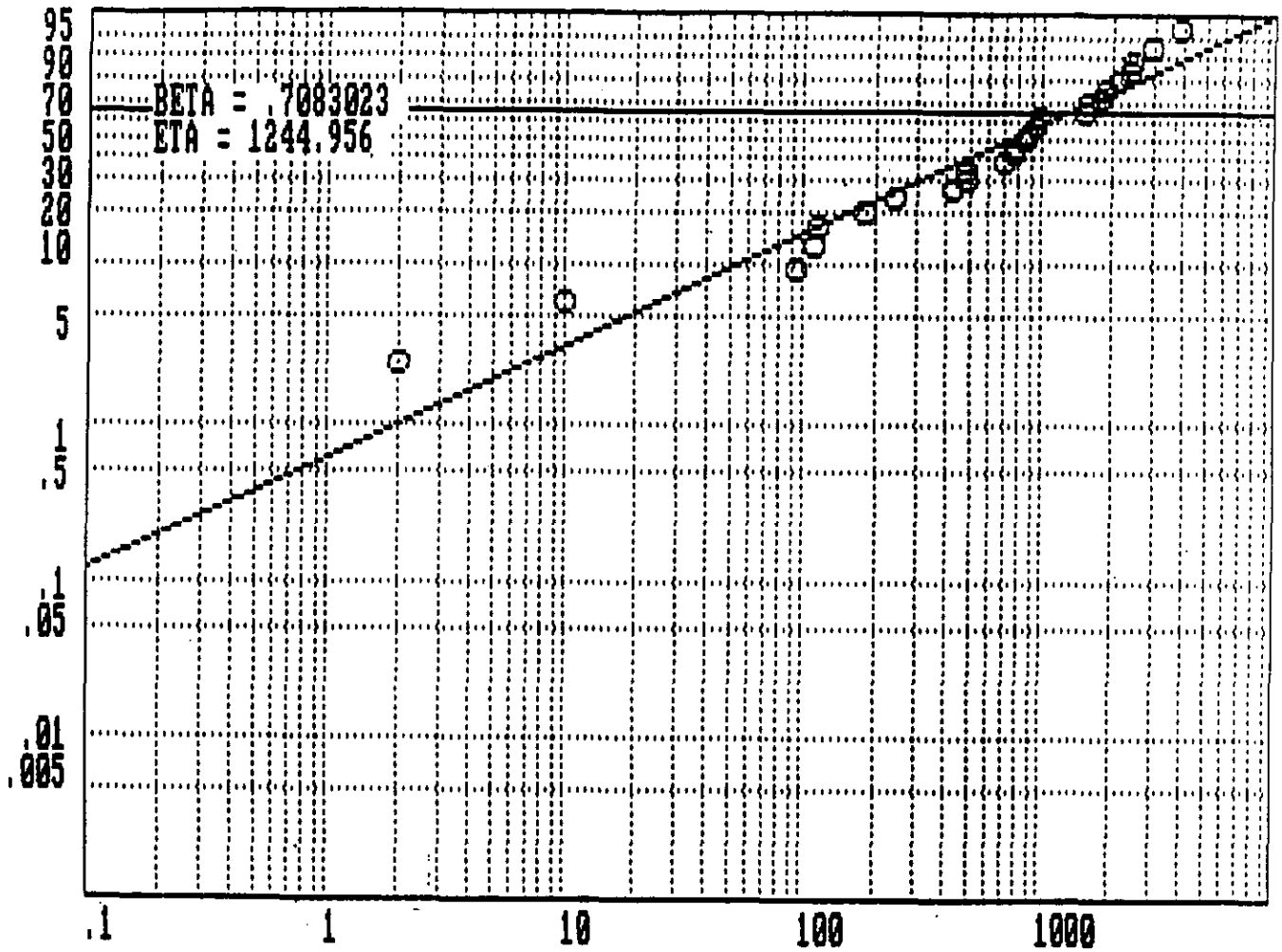

FIGURE 2. Weibull Failure Analysis of Process Centrifuges in Nuclear Fuel Reprocessing Facilities at SRS

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The authors are appreciative of pump history records that have been maintained by J. E. Thomas, R. R. Treadway, J. A. John, R. F. Lebert, and the late W. T. Seigler of the Savannah River Site Separations Section. The information contained in this article was developed during the course of work done under Contract No. DE-AC09-88SR18035 with the U. S. Department of Energy.

ABBREVIATIONS AND DEFINITIONS

Information in the data bank is essentially as abstracted from the source documents. The documents contain a significant amount of jargon; some of the abbreviations used are defined here as an aid to the reader.

ABBREVIATIONS	DEFINITIONS
AMPS	Amperage
ANSI	American National Standards Institute
C	Centrifuge
CM	Centimeter
CMS	Centimeters
CPO	Crane Process Operator
DC	Direct Current
DEG C	Degrees Centigrade
E&I	Electrical and Instrument Group
EP EM-420.1-1(m)	Equipment Piece, Extra Machinery, Centrifuge Designation (Typical)
ETE	Estimated Total Exposure (Radiation Dose)
G	Grams
HC	Hot Canyon
HCM	Hot Crane Maintenance
HCMA	Hot Crane Maintenance Area
HE	Head End (A Process Step)
HORZ	Horizontal
LBS	Pounds
L.L.	Liquid Level
M	Meter
MAX. RAD.	Maximum Radiation
MCC	Motor Control Center
MR	Millirem
MRAD	Millirad
NCR	Nonconformance Report
NR3 MCC	A Motor Control Center Identification Number (typical)
PA	Palladium
PU	Plutonium

(Continued on next page)

ABBREVIATIONS	DEFINITIONS (Continued)
SI	Separation Incident Report (Typical)
SS 734	A Centrifuge Motor Designator (Typical)
SWE	Separations Work Engineering
SWE-ES	Separations Work Engineering-Engineering Services
U	Uranium
UI	Unusual Incident Report (Typical)
WC	Warm Canyon
WDC	Warm Decon Cell
W.S.	Warm Shop
20006489	An Equipment Identification Number (Typical)
22100	Building 221
2BP	A Process Stream (Typical)
8-4	8am to 4pm Shift (Typical)
10.3H	A Vessel Location Designator in H Canyon (Typical)
11.1	A Vessel Location Designator (Typical)
40 RAD/1R/HR	A Quantitative Radiation Rate

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5. W. S. Durant, C. R. Lux, and W. D. Galloway. "Data Bank for Probabilistic Risk-Assessment of Nuclear-Fuel Reprocessing Plants." IEEE Transaction on Reliability, Vol. 37, No. 2, pp 138-143 (June 1988).

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7. W. S. Durant and W. D. Galloway. "Manipulator Operating Problems and Equipment Failures - Fuel Reprocessing Facilities - Savannah River Plant." DP-1696, E. I. du Pont de Nemours and Company, Savannah River Laboratory, Aiken, SC (January 1985).

8. W. S. Durant and W. D. Galloway. "Hot Canyon Crane Operating Problems and Equipment Failures - F-Canyon Reprocessing Facility - Savannah River Plant." DP-1713, E. I. du Pont de Nemours and Company, Savannah River Laboratory, Aiken, SC (February 1986).

9. W. S. Durant, J. B. Starks, and W. D. Galloway. "Process Pump Operating Problems and Equipment Failures - F-Canyon Reprocessing Facility - Savannah River Plant." DP-1731, E. I. du Pont de Nemours and Company, Savannah River Laboratory, Aiken, SC (February 1987).

10. W. S. Durant, J. B. Starks, J. M. Low, and W. D. Galloway. "Process Agitator Operating Problems and Equipment Failures - F-Canyon Reprocessing Facility." DP-1775, E. I. du Pont de Nemours and Company, Savannah River Laboratory, Aiken, SC (September 1988).

11. R. B. Abernethy. "Weibull Analysis Handbook." AFWAL-TR-83-2079, Pratt and Whitney Aircraft, West Palm Beach, FL (November 1983).

APPENDIX: Process Centrifuge Operating Problems And Equipment Failures In Canyon Reprocessing Facilities.

Data on the process centrifuges, as sorted from the 200-Area Fault Tree Data Bank, are as follows.

****
200 AREA FAULT TREE DATA STORAGE AND RETRIEVAL SYSTEM
****

12/05/89

AREA : F

FACILITY : CANYON

SPECIFICS : CENTRIFUGE

NO.	SOURCE	DATE	OCCURRENCE
46189	12, , , ,	08-20-55	EP 420.1-2F CENTRIFUGE. 10.3. SOUTH SKIMMER AND TACHOMETER FAILED. OPERATED 14 MONTHS.
253686	07, , , ,	01-00-56	LOSS OF THE SOUTH SKIMMER ON THE 10.3C CENTRIFUGE IN F-AREA DUE TO FAILURE OF HYDRAULIC LINES IN THE CANYON WAS CONFIRMED WITH ADDITION OF DYE TO THE HYDRAULIC SYSTEM AND OBSERVATION FROM THE CRANE. LIFE OF THE 10.3C MACHINE APPEARS LIMITED DUE TO EARLIER LOSS OF A TACHOMETER AND THIS RECENT FAILURE OF ONE OF THE TWO AVAILABLE SKIMMERS.
4857	07, , , ,	04----56	REFERENCE CONTAINS REVIEW OF CENTRIFUGE PROBLEMS.
253738	07,20, , ,	04-25-56	BY APRIL 25, 1956 THE HEAD END DF IN F AREA HAD DECREASED TO AN AVERAGE OF 1.8. CAUSE FOR THE LOSS IN DECONTAMINATION WAS NOT POSITIVELY ESTABLISHED BUT APPEARED TO BE ASSOCIATED WITH POOR MECHANICAL PERFORMANCE OF THE 10.3C CENTRIFUGE. RECENT FAILURE OF THE SECOND SKIMMER ON THIS CENTRIFUGE BECAUSE OF CONTINUAL LOSS OF HYDRAULIC OIL TO THE CANYON, LEFT THE UNIT WITHOUT DEPENDABLE MEANS FOR CAKE SKIMMING, (CONT. 253739)
253739	07,20, , ,	04-25-56	(CONT. FROM 253738) WHICH IS NORMALLY A CAREFULLY CONTROLLED OPERATION. OTHER DEFECTS: 1) THE LACK OF A SUITABLE TACHOMETER; 2) LEAKAGE IN THE CAKE SPRAY SYSTEM WHICH RESULTED IN SUB-NORMAL SPRAY PRESSURE, ARE BELIEVED TO HAVE CONTRIBUTED TO THE POOR PERFORMANCE.
1667	20,12,07, ,	05----56	10.3C CENTRIFUGE REPLACED. DIFFICULTY IN TIGHTENING THE HYDRAULIC SYSTEM. EP-EM 420.1-1 WAS INSTALLED AND LATER WAS MOVED TO 10.3H IN AUG. 1957.
253752	07, , , ,	05-00-56	THE BOTTOM REMOVABLE SPRAY IN THE 11.1C CENTRIFUGE WAS FOUND TO BE PARTIALLY PLUGGED, RESULTING IN SUB-NORMAL FLOW OF BOWL SPRAY AT NORMAL OPERATING PRESSURES.
253766	07, , , ,	06-00-56	CENTRIFUGE SKIMMER OPERATION CONTINUES TO BE UNSATISFACTORY. THE PRINCIPLE DIFFICULTY IS THE INABILITY TO REPRODUCE THE SKIMMER POSITION ON CONSECUTIVE SKIMMING OPERATIONS.
1784	20,07, , ,	07----56	PITTING OF CENTRIFUGE HYDRAULIC CYLINDERS AND INABILITY TO REMOVE ALL AIR HAVE CAUSED DIFFICULTY IN POSITIONING DEVICES ON SKIMMERS. SKIMMER STRIKING CAKE

NO.	SOURCE	DATE	OCCURRENCE
4862	07, , , ,	08----56	OVER-SKIMMING IN CENTRIFUGE 15 PERCENT OF THE TIME, 2500 LBS U, 300 G PU
253804	07, , , ,	08-00-56	A STUDY GROUP FOUND THAT THE MAJOR FACTOR CONTRIBUTING TO FAULTY SKIMMING WAS LEAKAGE OF AIR INTO THE SKIMMER HYDRAULIC SYSTEM. THIS AIR, WHICH CANNOT BE PROPERLY VENTED FROM THE EXISTING EQUIPMENT, RESULTS IN NONREPRODUCIBLE POSITIONING OF THE HYDRAULIC CYLINDERS AND SKIMMERS.
4756	12, , , ,	10-27-58	EP-EM 420.1-2 INSTALLED IN POSITION 11.1F. REPLACED EP 420.1-1F WHICH HAD OPERATED 52 MONTHS.
46231	12, , , ,	01-29-59	EP-EM 420.1-2. CENTRIFUGE. TACHOMETER INOPERABLE. 11.1. MACHINE WOULD NOT RUN 94 DAYS IN SERVICE.
4782	04, , , ,	02-02-59	11.3C COOLING FAN STRIKING HOUSING
4864	07,12, , ,	02-08-59	EM CENTRIFUGE MOTOR DAMAGED BY FAULTY ELECTRICAL JUMPER DURING INSTALLATION. EP-EM 420.1-2. 11.1 POSITION. SAME DAY.
4785	04, , , ,	05-28-59	SKIMMER STRIKING 11.1C BOWL WALL
2411	20, , , ,	11----59	FAILURE OF TRANSMITTER BELLOWS IN 11.1C SKIMMER HYDRAULIC SYSTEM.
4797	04, , , ,	02-03-60	11.3C SPRAY JUMPER LEAK
4808	04, , , ,	06-12-61	CENTRIFUGE HEEL JET FAILURE
4851	01, , , ,	02-01-62	2000 LBS 11.1C MATL SENT TO 11.3E RATHER THAN RECYCLED. FAILURE TO OBTAIN SUPERVISOR APPROVAL AND NOT REQUESTING GANG VALVE TO BE UNLOCKED. OPERATOR INATTENTION. VIOLATE RUNBOOK.
4811	04, , , ,	04-16-62	SEVERAL CENTRIFUGE JUMPER LEAKS.
2713	20,04,12, ,	03-13-63	11.1C CENTRIFUGE MAIN DRIVE MOTOR FAILED. PROBABLY INSULATION BREAKDOWN. EP-EM 420.1-2. 50 MONTHS.
6783	04, , , ,	04-01-63	ELECTRICAL OUTAGE NR3 MCC DUE TO FAULT IN CENTRIFUGE SWITCH GEAR. FIRST CYCLE DOWN AS A RESULT.
21896	12, , , ,	04-13-63	EP EM 420.1-4 INSTALLED IN 10.3F. MOVED TO 10.3H ON 10/29/64.
4870	07,12, , ,	05----64	INSTALLED 11.1C. EP 420.1-2F.
4871	07, , , ,	03----67	NEUTRON MONITOR CABLES 11.1C REPLACED AFTER 2 YRS DUE TO RADIATION DAMAGE
4832	04,07,12, ,	11-28-68	11.1C FROZEN BEARINGS, 59 MONTHS. EP 420.1-2F. REPLACED WITH EP 420.1-1H.
4836	04,07,12, ,	03-30-70	CENTRIFUGE STOPPED IN MIDDLE OF RUN FROM ELECTRICAL SHORT. 11.1 EXCESSIVE VIBRATION. EP 420.1-1H. 485 DAYS IN SERVICE. REPLACED WITH EP-EM-420.1-3.

NO.	SOURCE	DATE	OCCURRENCE
12453	28, , , ,	04-07-76	WC DECON CELL, WC TRUCKWELL AND AIRLOCK - CENTRIFUGE NO. SS-733 WAS REMOVED FROM WC DECON CELL AND LOADED INTO BURIAL BOX NO. 54 AND SENT TO REGULATED STORAGE SLAB FOR STORAGE. THE CENTRIFUGE HAS ONE SPOT ON THE POT TOP NEAR NOZZLE PIPES WHICH RADIATES 2000 MRADS/200 MR/HR @ 2 INCHES AND IN GENERAL IT RADIATES 10 MR/HR @ 2 INCHES. RADIATION LEVEL @ 2 INCHES OF SIDES OF BURIAL BOX WAS 3 MR/HR. TRANSFERABLE (CONT 12454)
12454	28, , , ,	04-07-76	(CONT FROM 12453)CONTAMINATION ON TRAILER AND BOX WAS WITHIN LIMITS.
10584	32, , , ,	10-24-76	CENTRIFUGE UPPER SPRAY NOZZLE 6(11.1C)14 IS LEAKING.
12688	27,04,32,12,	02-25-77	FOUND LEAK RATE OF 16 LITERS/HR AT COVER GASKET OF 11.1 CENTRIFUGE BOWL CASING. UNIT HAD ABOUT 6.8 YR SERVICE. LOST 5 DAYS OF HEAD END PROCESSING TIME. SI-77-3-26. EP-EM 420.1-3. 80 MONTHS IN SERVICE. REPLACED WITH EP 420.1-1(M).
21097	32, , , ,	03-01-77	HEAD END - CENTRIFUGE RAN BACKWARDS ON BOTH SPEEDS, REVERSED LEADS, NOW OK. INSTALLING JUMPERS PER SPECIAL PROCEDURE.
22339	32, , , ,	03-07-77	HEAD END - REPAIRED 7F TO 11.1C SPRAY PUMP.
21066	32, , , ,	04-21-77	HEAD END - E&I REPAIRED 11.1C SPRAY.
34568	32, , , ,	03-28-78	UNABLE TO WASH CENTRIFUGE. SELSYN LOADING UP TO 8 AMPS AT POSITION 5.
18549	04,32,33,12,55	07-26-78	HEAD END CENTRIFUGE IN F FAILED. 16 MONTHS. OUT 8 SHIFTS. EP-420-1-1(M). REPLACED WITH EP 420.1-2(M). 11.1C.
35096	32, , , ,	10-09-78	11.1C. UNABLE TO SPIN ABOVE 035 ON THE COUNTER WITHOUT EXCEEDING 8 AMPS.
13280	33,32,04, ,	12-18-78	REMOVED THE 11.1C ELECTRO SYNCHRO TO HCMA. 8-4 SHIFT. 4 DAYS.
36280	33, , , ,	02-14-79	INSPECTED CENTRIFUDGE IN WDC, FOUND NUMEROUS TROUBLES. 8-4 SHIFT.
36332	33,32, , ,	03-10-79	COMPLETED WORK ON SPECIAL PROCEDURE FOR FREEING UP 11.1C NORTH SKIMMER, REMOVED ELECTRO SYNCHRO JUMPER 3(11.1C)18, FREED UP NORTH SKIMMER USING THE SPECIAL TOOL ON IMPACT WRENCH, REPLACED JUMPER AND CHECKED OUT SKIMMER, APPEARS TO BE WORKING OK. 4-12 SHIFT. 2 SHIFTS.
37184	32, , , ,	03-15-79	HEAD END. 11.1C SKIMMER WON'T GO PAST 007. SELSYN LOAD OVERLOADS (10 AMPS) 12-8 SHIFT. 1 SHIFT.
37202	32, , , ,	03-24-79	HEAD END. WASHED 11.1-C AND SHUT DOWN, STILL HAVING TROUBLE AT BEGINNING OF WASH WITH EXCESSIVE AMPS AND VIBRATIONS ON HAND WHEEL. 8-4 SHIFT.
37307	32, , , ,	03-30-79	HEAD END. 11.1C SKIMMER TO BE REPAIRED ON 4-12. 8-4 SHIFT.
47748	31, , , ,	02-11-80	20006489 TANK-H E CONDENSATE 11.1 22100 NON-ROUTINE MAINT
47749	31, , , ,	02-15-80	20006489 TANK-H E CONDENSATE 11.1 22100 NON-ROUTINE MAINT

NO.	SOURCE	DATE	OCCURRENCE
44384	32,31, , ,	02-16-80	HEAD END. HAD TROUBLE GETTING 11.1C ON FAST SPEED. E&I FOUND A TIME DELAY RELAY MOTOR HANGING UP IN MCC. CORRECTED. 12-8 SHIFT. 20006489. 20006490.
44396	32, , , ,	02-21-80	HEAD END . 11.1C - UNABLE TO GET SPEED UP TO 1740 RPM. 4-12 SHIFT. 2 SHIFTS.
47750	31, , , ,	02-22-80	20006489 TANK-H E CONDENSATE 11.1 22100 NON-ROUTINE MAINT
43184	32, , , ,	02-27-80	HEAD END. 11.1C REPAIRING NORTH SKIMMER. 8-4 SHIFT.
47751	31, , , ,	03-03-80	20006489 TANK-H E CONDENSATE 11.1 22100 NON-ROUTINE MAINT
52733	32, , , ,	03-05-80	HEAD END - E&I REPAIRED BRAKES ON 11.1C. 8-4 SHIFT.
47752	31, , , ,	03-06-80	20006489 TANK-H E CONDENSATE 11.1 22100 NON-ROUTINE MAINT
52741	32, , , ,	03-06-80	HEAD END - 11.1C - CONTAINS 4 CAKES. COULD NOT WASH BECAUSE OF TROUBLE WITH SKIMMER. 4-12 SHIFT.
52748	32,31, , ,	03-10-80	HEAD END - 11.1C - RUN AT 870 RPM. 3 CAKES, BEING PROBLEM WITH SKIMMER. 12-8 SHIFT. 20006489.
47753	31, , , ,	03-13-80	20006489 TANK-H E CONDENSATE 11.1 22100 NON-ROUTINE MAINT
52759	32, , , ,	03-14-80	HEAD END - 11.1C - RUNNING AT 870 RPM, UNABLE TO CLEAN BECAUSE SKIMMER WILL NOT GO BEYOND .007. 12-8 SHIFT.
52775	32, , , ,	03-23-80	HEAD END - REPAIRED SKIMMER ARM. 8-4 SHIFT.
54234	32, , , ,	08-12-80	HEAD END - 11.1C SKIMMER STUCK IN OUT-STOP POSITION, COULD NOT WASH. 4-12 SHIFT.
54258	32,12, , ,	08-22-80	HEAD END - 11.1C - 4 CAKES, HAVING SKIMMER PROBLEMS. EP 420.1-2(M) FAILED. 12-8 SHIFT. 25 MONTHS SERVICE REPLACED WITH EP EM 420.1-1 ON 8/26/80.
60000	33,31,28, ,	08-26-80	POWER JUMPER 4(11.1C)10 IS BAD. 4-12 SHIFT. 20006490.
54303	32,33, , ,	09-12-80	HEAD END - 11.1C SKIMMER INOPERABLE. 12-8 SHIFT. 1 SHIFT.
54309	32,31, , ,	09-15-80	HEAD END - 11.1C LOCKED OUT UCC AND SYNCHRO BEHIND PANEL BOARD, SYNCHRO JUMPER REMOVED. 8-4 SHIFT. 20006489.
60024	33,32, , ,	09-19-80	REMOVED SYNCHRO JUMPER FROM 11.1C, PUT IN H.C.M. AND OILED. PUT BACK IN SERVICE. 8-4 SHIFT.
54338	32, , , ,	09-26-80	HEAD END - SYNCHRO JUMPER IS FROZE UP AGAIN. 4-12 SHIFT.

NO.	SOURCE	DATE	OCCURRENCE
60036	33, , , ,	09-28-80	11.1C ELECTRO-SYMCHRO JUMPER 3(11.1C) WAS REMOVED FROM POSITION TO HCMA. CHECKED OUT AND LUBRICATED THEN REINSTALLED, STILL UNABLE TO SKIM. 4-12 SHIFT.
54353	32, , , ,	10-02-80	HEAD END - 11.1C - SKIMMER PROBLEMS AGAIN. 12-8 SHIFT.
54361	32, , , ,	10-06-80	HEAD END - 11.1C SKIMMER FROZE UP AGAIN. 12-8 SHIFT.
54374	32, , , ,	10-15-80	HEAD END - 11.1C SKIMMER JUMPER IS GIVING TROUBLE AGAIN. 12-8 SHIFT.
57766	28, , , ,	11-12-80	H.C.M.A. - E&I MADE WIRING REPAIRS ON SKIMMER JUMPER. 8-4.
74758	33, , , ,	01-28-81	WHILE MOVING CENTRIFUGE FROM 17.1 CELL COVER, OPERATOR SAID H-6 YOKE WAS BENT. 4-12
75273	32, , , ,	04-01-81	11.1C - THREE CAKES COULD NOT GET SKIMMER TO WORK FOR CAKE REMOVAL. 4-12
75246	33, , , ,	04-15-81	11.1C SKIMMER JUMPER IS BINDING AGAIN. 12-8
76463	32, , , ,	09-28-81	11.1C THE COIL FAILED ON BTR RELAY ALLOWING BRAKES TO ENGAGE. 4-12
81252	20, , , ,	10----81	BAD JUMPER CONNECTION CAUSED ERATIC OPERATION OF CENTRIFUGE SOUTH SKIMMER.
76684	32, , , ,	10-01-81	HEAD END - HAVING TROUBLE WITH 11.1C SKINNER AND BRAKE. 8-4
76715	32,31, , ,	10-08-81	HEAD END - 11.1C SKINNER WON'T WORK PROPERLY, WON'T GO ABOVE 23. 12-8. 20006489.
76747	32, , , ,	10-15-81	HEAD END - 11.1C, 3 CAKES TRIED TO SKIM & CENTIFUDGE IS TOO TIGHT. 12-8
76653	33,28,31, ,	10-20-81	11.1C SOUTH SKIMMER IS FROZEN. THE NORTH SKIMMER JUMPER 3(11.1C)18 STILL NEEDS E&I WORK. 4-12. THE EXPOSURE RATE WAS 1000 MRADS/ 100 MR/HR AT 30 CMS. 20006489.
76679	33,32,31, ,	10-28-81	CHANGED OUT THE TACH JUMPERS ON 11.1C. 8-4. 1 SHIFT. 20006489.
76810	32,20, , ,	10-30-81	HEAD END - THE TACH ON 11.1C HAS FAILED AGAIN. 4-12. CAUSED BY CONDENSATE LEAK FROM 11.3.
76907	28, , , ,	10-31-81	H.C.M.A. - SURVEYED 11.1-C CENTRIFUGE TACHOMETER AT 45 CMS. EXPOSURE RATE WAS 20 RAD/ 2 R/HR. 12-8.
77084	32,33, , ,	11-06-81	HEAD END - 11.1C WILL NOT SKIM. 4-12. 3 DAYS
22138	31, , , ,	02-16-82	20006489 TANK-H E CONDENSATE 11.1 22100 NON-ROUTINE MAINT
22202	31, , , ,	03-22-82	20006489 TANK-H E CONDENSATE 11.1 22100 NON-ROUTINE MAINT
22225	31, , , ,	08-09-82	20006489 TANK-H E CONDENSATE 11.1 22100 NON-ROUTINE MAINT

NO.	SOURCE	DATE	OCCURRENCE
22407	31, , , ,	08-18-82	20006490 TANK-11.1C-HE CONDENSATE 22100 NON-ROUTINE MAINT
22406	31, , , ,	09-14-82	20006489 TANK-H E CONDENSATE 11.1 22100 NON-ROUTINE MAINT
105183	55, , , ,	09-22-82	SHIFT MAINT. REPAIRED LEAKS ON 11.1C SPARGE LINE ON 2ND LEVEL SECTION (11H) AT NOZ. 5 & 6. 4-12.
130193	28, , , ,	08-01-83	HOT SHOP - SURVEYED CENTRIFUGE FOR SEP. MAX - 40 RAD/1R/HR AT 30 CMS. 4-12.
129468	33, , , ,	08-02-83	TRIED TO INSTALL DRAIN LINE ON CENTRIFUGE NOZZLE 17, WOULD NOT TIGHTEN UP. 4-12.
129470	33, , , ,	08-03-83	GOT MAINTENANCE TO REPLACE HORZ. CONNECTOR ON DRAIN LINE FOR CENTRIFUGE. THE NUT SCREW WAS BENT AND BAIL HAD TO BE REPLACED. 12-8.
126825	32, , , ,	08-10-83	HEADEND. BRAKE NOT WORKING IN 11.1C. 4-12.
129550	33, , , ,	09-07-83	INSTALLED HORIZONTAL CONNECTOR WITH BROKEN DRAIN HOSE ON NOZZLE 17 ON CENTRIFUGE. 12-8.
129551	33, , , ,	09-08-83	THE JET HOSE BUSTED WHILE JETTING CENTRIFUGE BOWL TO FLOOR. 12-8. 3 SHIFTS.
149312	55, , , ,	07-30-84	E&I DISASSEMBLE AUTO VALVE ON 11.1C CENTRIFUGE. 4-12.
178301	32, , , ,	09-30-85	11.1C EMPTY - L.L. PROBABLY PLUGGING. 8-4.
204110	32, , , ,	04-30-86	11.1C CENTRIFUGE IS LOCKED OUT FOR FEED JUMPER REPLACEMENT. 4-12.
204175	32,33,28, ,	05-09-86	11.1C TACHOMETER FAILED AT 3:40 AM. E&I TROUBLESHOT AND FOUND PROBLEM TO BE IN CANYON. 3 RAD/150MR AT 1M. 12-8.
204199	32,04,12, ,	05-12-86	INSTALLED THE NEW 11.1C MOTOR POWER JUMPER. JUMPER MEGGED BAD IN THE BEGINNING. REPOSITIONED JUMPER AND MEGGED OKAY. THE 11.1C WILL RUN OKAY ON SLOW SPEED. WHEN GOING TO HIGH SPEED FUSES WILL BLOW. 4-12. EP EM 420.1-1. 69 MONTHS IN SERVICE. 11 DAYS TO REPLACE. REPLACED WITH EP EM 420.1-4.
212211	33, , , ,	05-17-86	WENT TO H-AREA TO CHECK CENTRIFUGE ON RUNNING. MAINT. WELDED ALL SCREW FITTINGS ON LUBE LINES. STARTED CENTRIFUGE UP AND HAD A OIL LEAK ON UNION ON WEST SIDE. 4-12.
211170	55,33, , ,	05-18-86	PROCESS REMAIN DOWN, DUE TO THE INSTALLATION OF 11.1C CENTRIFUGE. 4-12.
204248	32, , , ,	05-19-86	E&I WORKED ON 6E AND 11.1C ALL SHIFT. 8-4.
181729	04, , , ,	05-21-86	CHECKS ON THE 11.1C CENTRIFUGE MOTOR REVEALED THAT THE MOTOR WAS NOT FAILED AND ELECTRICAL POWER SUPPLY PROBLEMS WERE SUCCESSFULLY RESOLVED.
181732	04,12, , ,	05-22-86	11.1C CENTRIFUGE RETURNED TO SERVICE ON THE 12-8 SHIFT. EP 420.1-2.

NO.	SOURCE	DATE	OCCURRENCE
181676	17, , , ,	05-23-86	11.1 CENTRIFUGE - OPERATIONS WAS UNABLE TO SWITCH THE CENTRIFUGE FROM SLOW TO HIGH SPEED DUE TO A FAILED AUXILIARY CONTACT ON THE HIGH SPEED RELAY.
204312	32, , , ,	05-29-86	CENTRIFUGE WOULD NOT GO TO HIGH SPEED. 4-12.
188495	52,04,32,12,	09-12-86	THE HEAD END CENTRIFUGE EXPERIENCED A BEARING FAILURE ON SEPTEMBER 12, 1986. PUREX DISSOLVING AND HEAD END PROCESSES WERE DOWN 21 DAYS FOR REPLACEMENT OF THE CENTRIFUGE. EP EM 420.1-4 WAS IN SERVICE 113 DAYS. 11.1C.
205671	32,33, , ,	09-16-86	PROCESS DELAYS - THE DISSOLVING OF TARGETS AND THE PROCESSING OF PUREX FEED REMAINS DOWN, UNTIL THE REPLACEMENT 11.1C UNIT, EN420.1-5 IS CHECKED OUT, RUN IN AND APPROVED FOR CANYON SERVICE. 8-4.
188281	04, , , ,	09-23-86	WORK IS UNDERWAY TO REMEDY VIBRATIONAL PROBLEMS OF THE NEW CENTRIFUGE.
188387	17, , , ,	09-26-86	MEGGER READINGS ON THE SIX WIRES FOR NOZZLE 4, SECTION 11, WERE TAKEN ON 9/23. THESE READINGS SHOWED A LOW RESISTANCE BETWEEN WIRES 1 AND 6, 1 AND 4, AND 4 AND 6.
188318	04,52,32, ,	10-03-86	THE NEW CENTRIFUGE HAS BEEN INSTALLED AND LEAK CHECKED. A LEAK ON THE OUTLET JUMPER WILL BE REPAIRED TODAY. EN 420.1-5.
205801	32,33, , ,	10-03-86	CRANE OPERATOR DETECTED UNUSUAL NOISE COMING FROM CENTRIFUGE DURING OPERATION. FURTHER CHECKOUT NOTICED THE POSSIBLE SOURCE OF NOISE WAS COMING FROM THE NORTH SKINNER ARM. 4-12.
205804	32,52, , ,	10-04-86	E&I REPLACED FUSES ON 11.1C BRAKE. 12-8.
188328	04, , , ,	10-06-86	THE NEW CENTRIFUGE WAS PLACED IN SERVICE ON FRIDAY.
206332	32,04, , ,	11-03-86	11.1C WILL NOT OPERATE. 12-8.
213972	28, , , ,	11-05-86	SWIMMING POOL - MADE A RADIATION SURVEY OF A USED CENTRIFUGE WITH EXTENDED INSTRUMENT THROUGH GLOVE PORTS. MAXIMUM RADIATION LEVEL DETECTED = 35 R/HR AT 1 METER. 8-4.
189858	52, , , ,	11-12-86	REPAIRS TO THE FAILED 11.1C CENTRIFUGE WERE COMPLETED. THE CENTRIFUGE WAS RETURNED TO NORMAL OPERATION ON NOVEMBER 12, 1986.
213312	33, , , ,	12-20-86	CENTRIFUGE STARTED HUMMING. UNCOVERED AND INSPECTED. COULDN'T SEE ANYTHING UNUSUAL. 12-8.
193546	04,52,32,55,33	01-30-87	THE HEAD END CENTRIFUGE FAILED ON 12-8 SHIFT. LOWER BEARING FAILURE. 11.1C. EN 420.1-5. 116 DAYS IN SERVICE. REPLACEMENT UNIT EPEM 420.1-2. ALSO SOURCE 12.
238485	28, , , ,	01-30-87	HCMA - SEP. ATTACHED A VIDEO CAMERA TO N. MONORAIL TO TAKE PICTURE OF CENTRIFUGE MALFUNCTION. MAX. EXP. DOSE RATE WAS 1000MRADS/100MR/HR, (BETA DOUBLED). 12-8.
238852	28,04, , ,	02-02-87	HC SHOP - SURVEYED FOR SEP. AND SWE TO ENTER THE HOT SHOP FOR WORK ON A CENTRIFUGE. 1000/200 MRADS/MR/HR. 8-4.

NO.	SOURCE	DATE	OCCURRENCE
236450	55, , , ,	02-22-87	MAINTENANCE LUBRICATED 11.1C AT 10 A.M. WITH 3 SHOTS OF A522, THEN AT 1300 FOUR MORE SHOTS AFTER REPORTS OF NOISE COMING FROM UNIT. 8-4.
231169	32, , , ,	03-07-87	11.1C SPRAY LIGHTS DID NOT INDICATE FROM 7F. 8-4.
231349	32, , , ,	03-29-87	11.1C UPPER AND LOWER SPRAY LIGHT NOT OPERATING. 4-12.
238723	28, , , ,	04-14-87	HOT SHOP - SURVEY MADE FOR SEP. ON CENTRIFUGE. MAX. RAD. LEVEL AT 45 CMS WAS 6RAD/3R/HR. 8-4.
210357	76, , , ,	06-15-87	NCR NUMBER 2609 - A JET JUMPER FOR THE 221-F CENTRIFUGE WAS BEING FABRICATED IN THE JUMPER SHOP. THE COMPLETED JUMPER HAD BEEN DESIGNED AND FABRICATED TO NOZZLE NO. 83 INSTEAD OF 84 DUE TO FAULTY COMMUNICATION.
233535	32, , , ,	11-28-87	HAVE E&I CHECK OUT 11.1C SPRAY LIGHTS AND BREAKER IN MCC NO. 2. SPRAY LIGHTS DID NOT COME ON AND BREAKER KEPT TRIPPING OUT WHILE CLEANING THE CENTRIFUGE. 8-4.
239701	28, , , ,	12-17-87	HOT SHOP - SURVEYED THE 11.1 CENTRIFUGE FOR SEP. PLASTIC SUITS WORN. GASKET ON NORTH SIDE WAS 4000MRADS/1R/HR AT 30 CMS. 12-8.
235298	32, , , ,	01-30-88	HEAD END - 11.1C - DOWN AND DRAINED - BELIEVE THERE IS A PROBLEM WITH CENTRIFUGE BRAKES BECAUSE IT TOOK 1 HOUR FOR IT TO STOP. 8-4.
238209	28, , , ,	02-01-88	HOT SHOT - SURVEYED CENTRIFUGE. NORTH SIDE AT 60 CMS, 1000/100 MRAD/MR/HR. 4-12.
235325	32, , , ,	02-02-88	TESTED THE SKIMMER OPERATIONS ON 11.1C AFTER JUMPER REMOVAL AND OPERATIONS WOULD NOT MAKE UP. THE SYNCHO JUMPER WAS MOVED TO HCMA AND FOUND TO HAVE BEEN BENT. 12-8.
235328	32, , , ,	02-02-88	E&I ADJUSTED THE 11.1C BRAKE. 8-4.
226108	04,32, , ,	02-04-88	F CANYON - THE CENTRIFUGE HAS BEEN RETURNED TO SERVICE FOLLOWING REPLACEMENT OF A FAILED SKIMMER JUMPER.
238236	28, , , ,	02-17-88	HOT SHOP - SURVEYED CENTRIFUGE. EXPOSURE RATES 2000MRAD/200MR/HR AT 45 CMS (BETA GAMMA DOUBLED), BOTTOM HALF. ETE: 1 HP 10 MR. 12-8.
238237	28, , , ,	02-17-88	HCMA - SURVEYED CENTRIFUGE MOTOR #14 AND UNKNOWN #. MAX. EXPOSURE ON MOTOR #14, 600MRAD/100MR/HR AT 20 CMS AND #? 2000MRAD/30MR/HR AT 30 CMS. 12-8.
238296	28, , , ,	03-10-88	HOT SHOP - MADE A SURVEY OF THE CENTRIFUGE. MAXIMUM RADIATION AT 30 CMS, 4000/500 MRADS/MR/HR, WHICH BE BLDG FROM SUMP. 8-4.

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200 AREA FAULT TREE DATA STORAGE AND RETRIEVAL SYSTEM
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12/05/89

AREA : H

FACILITY : CANYON

SPECIFICS : CENTRIFUGE

NO.	SOURCE	DATE	OCCURRENCE
4116	, , , ,07	01----55	PROBLEMS WITH CENTRIFUGE JET.
4119	, , , ,07	07----55	TACHOMETER FAILURE. CANNOT OPERATE CENTRIFUGE AT LOW SPEED.
253767	07, , , ,	06-00-56	CENTRIFUGE SKIMMER OPERATION CONTINUES TO BE UNSATISFACTORY. THE PRINCIPLE DIFFICULTY IS THE INABILITY TO REPRODUCE THE SKIMMER POSITION ON CONSECUTIVE SKIMMING OPERATIONS.
249364	07,12,07,20,	08-19-57	ONE OF THE HEAD END CENTRIFUGES IN H AREA WAS REMOVED FROM SERVICE ON AUGUST 19, 1957 BECAUSE OF A LEAK IN THE OUTLET AT THE GASKETED FLANGE WHICH IS INACCESSIBLE TO REMOTE MAINTENANCE; REPLACEMENT WAS MADE WITH A USED CENTRIFUGE FROM F AREA. EP 420.1-1H WAS FAILED UNIT. 10.3 POSITION ON 8/28/57. REPLACEMENT UNIT WAS EPEM 420.1-1. 31 MONTHS SERVICE.
249386	07, , , ,	09-07-57	OPERATION OF THE REPLACEMENT CENTRIFUGE FROM F AREA WAS INITIATED ON 09/07/57 AFTER SOME DIFFICULTY IN GETTING A SKIMMER IN OPERABLE CONDITION.
249472	07, , , ,	12-00-57	UNSATISFACTORY PERFORMANCE OF THE SKIMMERS WAS A CONTINUING PROBLEM DURING THE PERIOD. THE MAJOR DIFFICULTIES ENCOUNTERED DURING THE PAST SEVERAL MONTHS ARE: (1) SUDDEN LARGE DELTA P CHANGES IN THE HYDRAULIC SYSTEM DURING SKIMMING HAVE CAUSED FREQUENT RUPTURE OF THE SENSING BELLOWS IN THE DIFFERENTIAL PRESSURE TRANSMITTERS. THE OPERABLE SKIMMER SYSTEM ON CENTRIFUGE 11.1C HAS BEEN EQUIPPED WITH A STURDIER (CONT. 249473)
249473	07, , , ,	12-00-57	(CONT. FROM 249472) DELTA P INSTRUMENT TO DECREASE BELLOWS FAILURE. (2) APPARENT BINDING OF THE CENTRIFUGE 11.1C SKIMMER ARM, LIMITS MOVEMENT OF THE ARM SO THAT A LIQUID HEEL EQUIVALENT TO 100 LB OF WATER REMAINS IN THE BOWL COMPARED TO A NEGLIGIBLE HEEL FROM PROPER SKIMMING. BECAUSE OF THIS DIFFICULTY, THE CENTRIFUGE NORMALLY IS ON STANDBY AND IS USED ONLY WHEN NECESSARY TO OBTAIN REQUIRED HEAD END (CONT. 249474)
249474	07, , , ,	12-00-57	(CONT. FROM 249473) THROUGH-PUT. (3) HYDRAULIC LEAKS IN THE CANYON PORTION OF THE SKIMMER SYSTEM, NOT SUBJECT TO DIRECT MAINTENANCE, CAUSED LOSS OF THE USE OF ONE OF THE TWO INSTALLED SKIMMERS FROM EACH CENTRIFUGE.

NO.	SOURCE	DATE	OCCURRENCE
2876	, , ,04,07	01-26-58	10.3 CENTRIFUGE SKIMMER BINDING.
4784	04, , , ,	04-27-59	10.3C INOPERABLE - ELECTRICAL
4787	04, , , ,	08-11-59	BOWL BINDING IN 10.3C
4875	04, , , ,	09-21-59	10.3C VIBRATED BADLY, SHUT DOWN
204104	12, , , ,	01----63	EP EM 420.1-3 INSTALLED IN POSITION 10.3H.
2904	, , , ,04	01-03-63	CENTRIFUGE FEED JET PLUGGAGE.
46197	12, , , ,	01-10-63	EP 420.1-2H CENTRIFUGE. 11.1. SUDDEN STOPPAGE DUE TO EXCESSIVE VIBRATION. ORIGINAL EQUIPMENT. 96 MONTHS IN SERIVE.
3754	, , , ,04	01-15-63	RERUN CENTRIFUGE - FEED JET PLUGGED
3755	, , , ,04	05-24-63	JUMPER LEAK (CENTRIFUGE TO 12.1 TANK TRANSFER) LOSS OF AMERICIUM.
2728	20, , , ,	07----63	DETERIORATION OF 10.3C CENTRIFUGE VESSEL PARTS
158760	67, , , ,	08----63	CENTRIFUGE COMPONENTS, 20.1 - 2F. FAILURE OF VARIOUS COMPONENTS OF THE CENTRIFUGE LUBRICATION SYSTEM REQUIRED THAT IT BE OVERHAULED.
2677	04, , , ,	08-19-63	OVERFLOW CENTRIFUGE BOWL. PRODUCT LOSS.
46209	12, , , ,	10----63	EP-EM420.1-1 CENTRIFUGE. 10.3. MOTOR AND TACHOMETER FAILED. 62 MONTHS IN H, 16 MONHTS IN F FOR A TOTAL OF 18 MONTHS.
2905	, , , ,04	01-11-64	11.1C DRIVE MECHANISM FAILURE.
2766	20, , , ,	07----64	ROTOR ASSEMBLY UNREPAIRABLE ON EP-420.1-H CENTRIFUGE.
2914	, , , ,04	08-13-64	CENTRIFUGE TO 10.4 TANK JUMPER LEAK.
2916	, , ,07,04	10-27-64	EP-EM 420.1-3 CENTRIFUGE STOPPED RUNNING. 10.3. WOULD NOT RESTART. 23 MONTHS SERVICE. REPLACED FROM F WITH EP EM 420.1-4.
2809	20, , , ,	06----65	EXCESSIVE VIBRATION OF CENTRIFUGE. PROBABLY LOWER SPINDLE OVERSTRESS.
2918	, , , ,04	09-07-65	CENTRIFUGE JUMPER LEAK ON HYDRAULIC PRESSURE TO SKIMMERS.
2920	, , ,04,07	12-27-65	11.1C FAILED. EP EM 420.1-1 INSTALLED.
2921	, , ,12,04	12-31-65	MOTOR WINDINGS ON 11.1 C FAILED AFTER 2 DAYS. EP-EM 420.1-1.
2872	20,12, , ,	01----66	REPAIRS TO CENTRIFUGE EP-420.1-2H. SS 734. INSTALLED 11.1C ON 2/14/66.
4021	, , , ,07	01----66	HIGH TEMPERATURES IN CENTRIFUGE BOWL RESULTED IN HIGH PA-233 RELEASE. COOLING RETURNED RELEASE TO NORMAL.

NO.	SOURCE	DATE	OCCURRENCE
2930	20,12, , ,	01-21-66	CENTRIFUGE 10.3 EXPOSED TO AN INTERNAL TEMPERATURE OF 195 DEG C. STILL OPERATING BUT VIBRATION EXCESSIVE AND ELECTRICAL INSULATION DAMAGED. SEVERE CORROSION TO CARBON STEEL FRAME AND VISIBLE DAMAGE TO BOWL WHICH HAD BEEN SUBJECTED TO HIGH TEMPERATURE DURING OPERATION. EP-EM 420.1-4. 14 MONTHS IN H AND 18 MONTHS IN F FOR A TOTAL OF 32 MONTHS.
3302	20, , , ,	02----66	HYDRAULIC PIPING ON CENTRIFUGE HAS FAILED ON 4 OCCASSIONS AT THE THREADED PORTION OF THE JUMPER AT THE CYLINDER BLOCK.
2923	, , , ,04	03-31-66	CENTRIFUGE MOTOR FAILURE.
2924	,20,12,04,07	08-11-66	11.1C BROKEN TACHOMETER COUPLING ON MOTOR. EP 420.1-2H 6 MONTHS SERVICE. REPLACED WITH SAME REPAIRED UNIT 10-11-66.
204108	12, , , ,	08-15-66	EP EM 420.1-1 INSTALLED IN 10.3H.
204107	12, , , ,	01----67	EP EM 420.1-1 MOTOR SHAFT SLIPPING. CONTINUED RUNNING.
2926	, , ,12,04	03-16-67	10.3C SPEED INDICATOR MALFUNCTIONING. BROKE COMPLETELY 4/6/67. EP-EM-420.1-1. REMOVED BROKEN PARTS REMOTELY. CONTINUED OPERATING WITHOUT TACHOMETER.
158182	67, , , ,	09----67	FAILED CANYON CENTRIFUGE - RP-EM 420.1-3. CENTRIFUGE EP-EM-420.1-3 WAS REMOVED FROM SERVICE ON 12/24/65 AFTER SEIZURE OCCURRED BETWEEN THE BOWL AND CASING. 24 MONTHS. VISUAL INSPECTION OF THE STAINLESS STEEL COMPONENTS REVEALED NO CORROSION. HOWEVER, MECHANICAL DAMAGE WAS NOTED AS FOLLOWS: THE BOWL AND SHAFT RETAINING RINGS WERE DAMAGED BY EXCESSIVE VIBRATION.
2929	, , ,12,04	12-17-68	10.3C FROZEN BEARINGS. EP-EM 420.1-1. 28 MONTHS.
46259	12, , , ,	11-01-69	EP-EM 420.1-2. CENTRIFUGE INSTALLED IN 10.3C.
158175	67, , , ,	03-04-71	MOTOR SUPPORT COLLAR ON REPAIRED CANYON CENTRIFUGE - EM-420.1-4. DURING CHECKOUT OF THE REPAIRED CENTRIFUGE, A CRACK WAS NOTED IN THE CAST IRON MOTOR SUPPORT COLLAR. APPROX. 33 MONTHS. THE CRACKING PROBABLY OCCURRED WHEN THE INSPECTION PORT COVER PLATE WAS BEING BOLTED TO THE CAST IRON SUPPORT COLLAR. CRACKING OCCURPED IN A TAPPED HOLE AND PROGAGATED APPROX. 3 INCH.
46238	12, , , ,	12-06-71	EP-EM 420.1-2 CENTRIFUGE. 10.3C. 25 MONTHS. MOTOR FAILURE.
2934	20,04,12, ,	12-16-71	11.1C CENTRIFUGE HEAD BEARINGS FAILED - 62 MONTHS. EP 420.1-2H. REPLACED WITH EP EM 420.1-4 ON 12-23-71.
2935	04, , , ,	01-03-72	REPLACEMENT CENTRIFUGE MOTOR FAILED - EP-EM 420.1-4. 11.1C. 10 DAYS IN SERVICE.
2936	04,12, , ,	01-11-72	11.1C SKIMMER SYSTEM BEING REPAIRED. EP EM 420.1-4. REINSTALLED IN 11.1C
3537	10, , , ,	03----72	A MAINTENANCE MECHANIC RECEIVED NASAL CONTAMINATION TO 220 D/M BECAUSE HE REMOVED HIS CLOTHING IMPROPERLY AFTER WORK ON JUMPERS AND THE 10.3 CENTRIFUGE

NO.	SOURCE	DATE	OCCURRENCE
2937	, ,12,04,07	08-01-72	11.1C LEAKS DETECTED. EP-EM 420.1-4. 8 MONTHS.
204109	12, , , ,	08-03-72	EP EM 420.1-2 INSTALLED IN 10.3C.
2938	, , , ,04	08-14-72	REPLACEMENT 11.1C ALSO LEAKS.
46246	12, , , ,	08-29-72	EP-EM 420.1-2 CENTRIFUGE. FROZE UP AFTER 26 DAYS OPERATION IN 10.3C. FREED BY BUMPING AT HIGH SPEED.
2939	04, , , ,	10-26-72	CENTRIFUGE BLOWN FUSES TWICE AT LOW SPEEDS.
46256	12, , , ,	12-14-72	EP-EM 420.1-2 CENTRIFUGE. FROZE UP AFTER 3 1/2 MONTHS SINCE EARLIER FREEZE UP. FREED BY BUMPING. 10.3C.
158183	67, , , ,	01----73	THE CARBON STEEL A-FRAME ON CANYON CENTRIFUGE EP-EM 420.1-1 WAS VISUALLY INSPECTED. APPROX. 10 YRS. THE A-FRAME WAS GENERALLY IN POOR CONDITION. NITRIC ACID LEAKAGE AND/OR DECON SOLUTIONS HAD SEVERELY CORRODED THE SUPPORT LEGS (HOLES IN ONE LEG) AND NUMEROUS BOLTS.
158184	67, , , ,	04----73	FAILED CANYON CENTRIFUGE - EM-EM-420.1-1. AISI TYPE 304-L STAINLESS STEEL IN CONTACT WITH PROCESS SOLUTIONS. THE COMPONENT PARTS OF CANYON CENTRIFUGE EP-EM-420.1-1 WERE INSPECTED AFTER DECON. APPROX. 10 YRS. THE CENTRIFUGE PARTS WERE GENERALLY IN POOR CONDITION. THE STAINLESS STEEL BOWL, SHAFT AND DIP TUBE SLEEVES ARE ACCEPTABLE FOR RE-USE. THE CASING, FUME COVER, AND CASING TOP CONTAINED STRESS CORROSION (CONT. 158185)
158185	67, , , ,	04----73	(CONT. FROM 158184) CRACKS AND CANNOT BE REPAIRED. SOME DIP TUBES WERE BENT.
158186	67, , , ,	05----74	FAILED CANYON CENTRIFUGE - EP-EM-420.1-4. AISI TYPE 304-L STAINLESS STEEL IN CONTACT WITH PROCESS SOLUTIONS. CENTRIFUGE EP-EM-420.1-4 WAS REMOVED FROM SERVICE ON 8-9-72 WHEN THE CASE COVER LEAKED DURING SKIMMING. APPROX. 42 MONTHS. THE CENTRIFUGE PARTS INSPECTED WERE GENERALLY IN POOR CONDITION AND ARE NOT SUITABLE FOR ADDITIONAL SERVICE. THE CASE FLANGE WAS WARPED AND HAD STRESS CORROSION CRACKS ON THE (CONT. 158187)
158187	67, , , ,	05----74	(CONT. FROM 158186) GASKET SEAL SURFACE. STRESS CORROSION CRACKS WERE ALSO NOTED ON THE CASE AND FUME COVERS.
7390	07,04,20,12,	01-09-75	10.3C CENTRIFUGE FAILED AFTER 29 MONTHS. CAUSE: GROUNDING OF ELECTRICAL SYSTEM. SEVERE ARCING AT POWER INPUT NOZZLE. EP-EM 420.1-2. REPLACED WITH EP 420.1-1F. WHICH HAD BEEN EXHUMED AND REPAIRED 12/15/71. WAS ORIGINALLY IN 11.1F.
9015	20, , , ,	02----75	INTERMITTENT OPERATION OF DC BRAKING SYSTEM ON 10.3 CENTRIFUGE.
18014	32, , , ,	01-23-77	REPAIRED 10.3 SPRAY TIMER.
18020	32, , , ,	01-24-77	10.3C INDICATOR LIGHT FOR UPPER SPRAY BEING REPAIRED.
18233	32,20, , ,	05-19-77	REPLACED 10.3C SWITCH. 2 HOURS.
18249	32, , , ,	05-22-77	10.3C SPEED SELECTOR SWITCH OUT OF SEQUENCE. 5 DAY RT.

NO.	SOURCE	DATE	OCCURRENCE
18481	32, , , ,	06-27-77	REPAIRED 10.3C SWITCH.
18763	32, , , ,	07-13-77	REPLACED 10.3C SWITCH.
19271	32, , , ,	09-30-77	10.3C CENTRIFUGE WILL NOT BRAKE.
31301	32, , , ,	05-05-78	REPLACED 10.3C FUSE.
32060	32, , , ,	09-01-78	2BP - 10.3C BLEW FUSE. E&I REPLACED - POWER BACK TO NORMAL. 8-4 SHIFT.
41619	32, , , ,	09-08-79	HEAD END - 10.3C DIRTY - HIGH SPEED WILL NOT WORK - RELAY IS KICKING IN. 12-8 SHIFT. REPLACED. 1 SHIFT.
46589	20, , , ,	02----80	THE 7E CENTRIFUGE ACID SPRAY SYSTEM WAS FAULTY AND REPLACED.
50191	32,31, , ,	02-27-80	LOST POWER TO 10.3C AT APPROX. 12 NOON. 8-4 SHIFT. 24014801.
42204	27,01, , ,	05-15-80	MAXIMUM CENTRIFUGE FEED RATE OF 12 GAL/MIN WAS EXCEEDED WHEN SOLUTION WAS FED AT 13.7 GAL/MIN IN VIOLATION OF TECH. STD. SI-80-5-61. OI-221-H-80-7.
56028	32,31, , ,	05-20-80	E&I REPAIRED 10.3C RENATROL. 12-8 SHIFT. 24014808.
56304	32,31, , ,	07-09-80	THE BRAKE ON 10.3C WILL NOT WORK. 12-8 SHIFT. 24014801.
21324	31, , , ,	08-29-80	24014801 CENTRIFUGE 10.3 22100 420.1-1 NON-ROUTINE MAINT
49301	20, , , ,	10----80	MICROSWITCH IN PRESSURE SWITCH ON THE SKIMMER FOR THE CENTRIFUGE FAILED.
21326	31, , , ,	10-29-80	24014801 CENTRIFUGE 10.3 22100 420.1-1 NON-ROUTINE MAINT
58958	32,28, , ,	12-09-80	HEAD END - 10.2 - 10.3C DEVELOPED LEAK. JUMPER 98-69(10.2)5. 8-4 SHIFT. 2 SHIFTS.
21341	31, , , ,	12-18-80	24014809 MOTOR 40/10HP & AUX 10.3C22100 420.1-1 NON-ROUTINE MAINT
59010	32, , , ,	12-18-80	FOUND THE 10.3C ELECTRICAL FLEX JUMPER TO BE BAD. REPLACED WITH A NEW JUMPER. 4-12 SHIFT. 1 SHIFT.
59083	32, , , ,	12-31-80	HEAD END - 10.3C - LOST POWER TO CENTRIFUGE. E&I CHANGED FUSES. 8-4 SHIFT.
58730	32,31, , ,	01-05-81	REPLACED THE BLOWN FUSES IN THE 10.3C STARTER RACK. FOUND 90 AMP FUSES WERE BEING USED RATHER THAN THE 100 AMP FUSES THAT ARE REQUIRED. 12-8 SHIFT. 24014801.
72559	35, , , ,	05-27-81	W.S. - MAINT. REPAIRED CONDUIT ON CENT. FRAME TO MOTOR.
99676	32,31, , ,	02-28-82	E&I REPLACED FUSES IN 10.3C TWICE. 12-8. 24014808.
102536	31, , , ,	03-01-82	24015102 CENTRIFUGE 22100 420.3 NON-ROUTINE MAINT

NO.	SOURCE	DATE	OCCURRENCE		
102413	31, , , ,	03-24-82	24014801 CENTRIFUGE 10.3 NON-ROUTINE MAINT	22100	420.1-1
99943	32,31, , ,	03-30-82	HEAD END - 10.3C NO RPM INDICATOR, E&I REPLACED FUSE. 8-4. 24014808.		
100112	32, , , ,	04-14-82	E&I WORKED ON CENTRIFUGE IN WARM SHOP, REPLACING CENTRIFUGE BEARINGS. 8-4		
102442	31, , , ,	04-23-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
102445	31, , , ,	04-29-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
102446	31, , , ,	05-12-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
102449	31, , , ,	05-20-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
102470	31, , , ,	05-21-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
102478	31, , , ,	05-23-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
102482	31, , , ,	07-15-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
102414	31, , , ,	08-04-82	24014801 CENTRIFUGE 10.3 NON-ROUTINE MAINT	22100	420.1-1
101105	32, , , ,	08-05-82	E&I REPLACED 10.3C FUSES. 4-12		
102487	31, , , ,	08-18-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
102538	31, , , ,	08-26-82	24015103 CENTRIFUGE NON-ROUTINE MAINT	22100	420.4
102493	31, , , ,	09-01-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
102506	31, , , ,	09-07-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
102519	31, , , ,	09-09-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
102528	31, , , ,	09-10-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
102529	31, , , ,	09-15-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2

NO.	SOURCE	DATE	OCCURRENCE		
102530	31, , , ,	09-23-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
102535	31, , , ,	09-24-82	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
101720	32,31, , ,	10-05-82	HEAD END - HOLDING, DUE TO PROBLEMS WITH 10.3C. 8-4. 24014802.		
87349	04, , , ,	11-16-82	H CANYON - RECYCLE OF FIRST CYCLE FEED WILL CONTINUE WHEN A LEAKING CENTRIFUGE JUMPER HAS BEEN REPAIRED. WORK TO REMOVE, DECONTAMINATE, AND REGASKET JUMPER (10.3C - 10.4) IS IN PROGRESS.		
102155	32,31,12, ,	11-22-82	HEAD END - 10.3C UPPER AND LOWER SPRAY NOZ. HAVE BEEN REPLACED. 12-8. 24015105. EP 420.1-1F.		
106333	04, , , ,	12-09-82	H CANYON - UNSTABLE FEED RATES TO FIRST CYCLE AND FEED JET PLUGGAGE BY HEAD END SOLIDS CARRIED FORWARD FROM THE 10.3C HEAD END CENTRIFUGE HAVE SEVERELY LIMITED CANYON THROUGHPUT FOR THE LAST FEW WEEKS.		
102537	31, , , ,	12-22-82	24015102 CENTRIFUGE NON-ROUTINE MAINT	22100	420.3
122571	31, , , ,	06-03-83	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
122573	31, , , ,	06-29-83	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
122575	31, , , ,	07-13-83	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
122577	31, , , ,	08-01-83	24015101 CENTRIFUGE 11.1C H.C. NON-ROUTINE MAINT	22100	420.1-2
122563	31, , , ,	09-21-83	24014801 CENTRIFUGE 10.3 NON-ROUTINE MAINT	22100	420.1-1
122568	31, , , ,	09-27-83	24014801 CENTRIFUGE 10.3 NON-ROUTINE MAINT	22100	420.1-1
113147	32, , , ,	10-21-83	10.3C - WORKING SKIMMER ARM PROCEDURE. 12-8.		
122569	31, , , ,	11-16-83	24014801 CENTRIFUGE 10.3 NON-ROUTINE MAINT	22100	420.1-1
171400	31, , , ,	02-03-84	24212939 CENTRIFUGE 10.3 NON-ROUTINE MAINT	22100	420.1-1
138325	32, , , ,	02-24-84	CENTRIFUGE ARM WOULD NOT BUMP PAST 11; AMPS WELL OVER 10. SPRAYED WITH 150 LB 7E AND STILL WOULD NOT GO. 4-12.		
171402	31, , , ,	07-12-84	24213102 CENTRIFUGE NON-ROUTINE MAINT	22100	420.3

NO.	SOURCE	DATE	OCCURRENCE
140877	32, , , ,	10-22-84	WHILE INSTALLING 10.2 DROP JUMPER, CPO NOTICED SMOKE COMING FROM NOZZLE 13(10H) - ELECTRICAL NOZZLE TO 10.3C. CENTRIFUGE MOTOR TEMPERATURE INCREASED TO 63 DEGREE C. SUPPORT CABLE SNAPPED. 8-4.
140880	32,04, , ,	10-22-84	INSTALLED NEW POWER AND SKIMMER JUMPER AND THEY BOTH MEGGED GOOD. 4-12.
169082	32, , , ,	03-06-85	REPLACED FUSES ON 10.3C CENTRIFUGE. 8-4
168950	32, , , ,	05-02-85	HEAD END - 10.3C DIRTY - HAVING TROUBLE WITH SKIMMER ARM. 8-4.
150713	69,32, , ,	05-16-85	E&I - REPLACED FUSES ON CENTRIFUGE MOTOR.
153265	69,32, , ,	06-23-85	DOWN DUE TO 10.3C CENTRIFUGE MOTOR FAILURE. EP 420.1-1F. 125 MONTHS IN SERVICE. REPLACED WITH EP 420.1-2F ON 7-2-85.
153689	16,69, , ,	06-26-85	10.3C CENTRIFUGE RUN - ALL BREAKERS IN MCC3 WERE SET UP PER THE SEPARATIONS PROCEDURE AND ATTEMPTED TO "BUMP" THE MOTOR ON LOW SPEED TO CHECK ITS ROTATION. FOUND IT WAS WIRED BACKWARD ON POWER JUMPER AND REPAIRED. E & I THEN PLACED A CLAMP ON AMMETER ON THE LOW SPEED MOTOR LEADS DURING INITIAL RUN-IN. THE READINGS WERE FOUND TOO HIGH AND RUN-IN STOPPED. IT WAS ASSUMED THAT A POSSIBLE WIRING PROBLEM BETWEEN (CONT. 153690)
153690	16,69, , ,	06-26-85	(CONT. FROM 153689) THE HIGH AND LOW SPEED MOTORS WAS CAUSING THIS AND WAS FOUND TO BE THE CASE.
153691	16, , , ,	06-27-85	10.3C CENTRIFUGE RUN-IN - E & I CORRECTED THE WIRING PROBLEM MENTIONED IN PREVIOUS REPORT ON 4-12 SHIFT, 6/26/85, AND CENTRIFUGE BEGAN OPERATING AS INTENDED.
169587	32, , , ,	07-04-85	10.3C ADDED OIL TO CENT. HAD PROBLEMS WITH CONTROL OF SLOW SPEED 10 RPM & 140 RPM. 4-12.
153847	69,32,04, ,	07-07-85	10.3C - THE LOWER SPRAY APPEARS TO BE PLUGGED.
153849	69, , , ,	07-07-85	LEAKS WERE REPAIRED ON SPRAY JUMPERS, 10.2 TO 10.3C DROP JUMPER, 10.3C TO 10.4 JUMPER, AND 01.3C TO 8.4 ROUTE. ALSO HAD PROBLEMS WITH CENTRIFUGE SPEED CONTROL WHICH WAS CORRECTED BY REPLACING RESISTORS IN THE CIRCUIT.
153864	69,04, , ,	07-09-85	WORKED ON CENTRIFUGE SPRAY TIMER.
153642	04, , , ,	07-10-85	THE 10.3C CENTRIFUGE LOWER SPRAY IS NOW OPERATING NORMALLY. A STUCK VALVE SEAT ON THE WALL NOZZLE BLOCK VALVE WAS MADE FREE.
169263	32, , , ,	07-25-85	HEAD END - 10.3C DIRTY, AWAITING E&I REPAIRS TO THE L.L. 4-12.
154275	04,69, , ,	07-29-85	DISSOLVING AND HEAD END OPERATIONS ARE CURRENTLY DOWN DUE TO A FAILED INSTRUMENT SIGNAL ON THE CENTRIFUGE LIQUID LEVEL.
173326	32, , , ,	12-17-85	10.3C UPPER SPRAY INOPERATIVE. ATTEMPTED TO USE 7E PUMP (LEAKS BADLY). 4-12
162016	04,32,69, ,	12-18-85	HEAD END OPERATIONS WERE SLOWED BY AN INDICATION OF LOW PRESSURE FROM THE CENTRIFUGE SPRAY PUMPS. 7E AND 7F.

NO.	SOURCE	DATE	OCCURRENCE
161868	04, , , ,	12-19-85	THE CENTRIFUGE SPRAY PUMP WAS REBUILT YESTERDAY AND WILL BE TESTED TODAY.
173344	32, , , ,	12-19-85	10.3C DOWN FOR WORK ON SYNCHRO JUMPER. 8-4
161875	04,32, , ,	12-20-85	A PROBLEM WITH THE 10.3 CENTRIFUGE SKIMMER ARM CONTROL SHOULD BE CORRECTED TODAY.
173399	32,69, , ,	12-28-85	E & I REPAIRED CENTRIFUGE - REPLACED TIMER COIL. 8-4. 10.3C.
173415	32, , , ,	12-31-85	HAD MUCH PROBLEMS IN GETTING 10.3C SKIMMERS TO .051 "INSTOP". SKIMMER ARM APPEARS TO BE BINDING AND CAUSING HIGH AMPS. OR SKIMMER IS OUT OF SEQUENCE. 4-12
190438	32, , , ,	03-16-86	HEAD END. READY TO FEED CENTRIFUGE HAVING A PROBLEM WITH SKIMMER INSTOP. 12-8. 1 SHIFT.
176169	69,04, , ,	03-30-86	REPAIRED AND REPLACED 10.3C SKIMMER JUMPER. 3 DAYS.
176118	69, , , ,	04-16-86	10.3C SKIMMER JUMPER REPAIR CONTINUES.
176197	69,04,32,12,	04-17-86	WORKED ON 10.3C SKIMMER ARM MECHANICAL JUMPER. 4 HRS. SOUTH SKIMMER FAILED. OPERATING ON NORTH SKIMMER.
190931	32, , , ,	05-15-86	DUE TO EXCESSIVE VIBRATION AND APPARENTLY NO OIL FLOW, SPARE CENTRIFUGE IN WDC WAS STOPPED 5:15 AM. 12-8.
190955	32, , , ,	05-17-86	CENTRIFUGE IN WDC. STARTED CENTRIFUGE AND HAD (1) OIL LEAK. SHUTDOWN AND MAINTENANCE MADE WELD. 4-12.
191652	32, , , ,	07-20-86	WHILE FEEDING 10.2 TO 10.3,C THE CENTRIFUGE RPM INDICATOR STARTED DECREASING AND DROPPED TO APPROX. 370 RPM. THE 10.2 TO 10.3C JET WAS STOPPED AND CENTRIFUGE WAS RESTARTED AND APPEARS TO BE HOLDING AT 1870 RPM. 8-4.
189240	04,32,69, ,	11-07-86	FAILED CENTRIFUGE SS-737 WAS INSPECTED IN THE WARM DECON CELL AND DETERMINED TO BE SUITABLE FOR OVERHAUL AND USE AS A SPARE.
224619	28, , , ,	11-07-86	WARM DECON CELL - MAINT. STARTED TO REPAIR THE 10.3C CENTRIFUGE THIS SHIFT. 8-4.
189449	17, , , ,	11-19-86	THE CASE COVER GASKET ON THE BIRD CENTRIFUGE LEAKED WHEN SATURATED WITH WATER.
221780	32, , , ,	12-01-86	MAINT. WORKED ON CENTRIFUGE. 8-4.
221847	32,69, , ,	12-09-86	SHUT DOWN CENTRIFUGE SS-736 IN WDC AT 11:00 P.M. HAD ADDED OIL, BUT IT APPEARS OIL PUMP HAS FAILED. 4-12.
189850	04,69,32, ,	12-11-86	AN OIL LEAK WAS REPAIRED ON OVERHAULED CENTRIFUGE SS-736 AND RUN-IN WAS RESUMED AT 12:20 P.M. YESTERDAY.
224865	28, , , ,	02-24-87	WC DECON CELL - MAINT. CONTINUED DISASSEMBLY OF CENTRIFUGE IN DECON CELL. RADIATION OVER POT IS 1500 MRADS/100 MR/HR AT 45 CM. 4-12.

NO.	SOURCE	DATE	OCCURRENCE
224868	28, , , ,	02-25-87	DECON CELL - MAINT. REMOVED LID FROM CENTRIFUGE IN PREPARATION FOR SEP. TO DECON. RADIATION LEVELS - 2000/20 MRADS/MR/HR AT 45 CMS OF CENTRIFUGE; 2000/20 MRADS/MR/HR AT 45 CMS OF BOTTOM SIDE OF LID. 4-12.
222501	32, , , ,	02-26-87	SWE CONTINUED WORK ON CENTRIFUGE - STARTED PUTTING GEAR CASE BACK TOGETHER. 4-12.
225155	28,69, , ,	03-09-87	WARM DECONT. CELL - MAINT. STARTED TO WELD RING ON CENTRIFUGE LID. EXPOSURE DOSE RATE RANGED TO 1000/10 MRAD/MR/HR AT 10 CMS. 8-4.
225227	28, , , ,	04-09-87	HCMA - SEP. SAND BLASTED CENTRIFUGAL MOTOR. NO CHANGE IN DOSE RATE. WEST END 2000/100 MRADS/MR/HR AT 18 INCHES. 8-4.
224991	32, , , ,	04-15-87	IN PROCESS OF DISASSEMBLING THE FAILED CENTRIFUGE MOTOR IN WCMA. 4-12.
214378	69, , , ,	09-14-87	ASSISTED E&I WITH CENTRIFUGE MOTOR REPAIR.
218367	69, , , ,	09-29-87	REPAIR CENTRIFUGE MOTOR.
221264	69, , , ,	01-12-88	REPLACING BEARING ON CENTRIFUGE MOTOR, WARM SHOP.
226122	69, , , ,	02-04-88	E&I IS REPAIRING CENTRIFUGE, WDC.
227653	69, , , ,	03-10-88	BEGAN CENTRIFUGE REPAIRS.
231154	69, , , ,	04-11-88	E&I REPLACED TACHOMETER SWITCH, HI/LO RPM ON CENTRIFUGE.
231035	69, , , ,	04-16-88	REPAIRING CENTRIFUGE, WDC.
248345	69, , , ,	11-21-88	E&I IS OVERHAULING CENTRIFUGE NO. 734 IN THE WARM DECON CELL.
249158	69, , , ,	11-22-88	OVERHAULING CENTRIFUGE #734 IN THE WARM DECON CELL.
249020	16, , , ,	12-16-88	SWE-ES HAS ISOLATED THE MOTOR TO DETERMINE IF IT IS THE ROOT CAUSE OF THE EXCESSIVE VIBRATION IN THE CENTRIFUGE. THE VIBRATION DATA SHOWED POSSIBILITIES OF MISALIGNMENT, UNBALANCE OR WORN BEARINGS.
250794	69, , , ,	02-09-89	E&I REWIRED CENTRIFUGE #734 IN WDC.

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33	D. F. Baughman, 773-42A
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