DATA BANKS FOR RISK ASSESSMENT
AT THE SAVANNAH RIVER SITE (U)

by

W. S. Durant, C. R. Lux, and D. F. Baughman
Westinghouse Savannah River Company
Savannah River Site
Aiken, SC 29808

A paper proposed for presentation at the
DOE/ANL Training Course on the Prevention
of Significant Nuclear Events
Augusta, GA
April 1990

and for publication in the course notes

This article was prepared in connection with work done under Contract No. DE-AC09-88SR18035
with the U. S. Department of Energy. By acceptance of this article, the publisher and/or recipient
acknowledges the U. S. Government's right to retain a nonexclusive, royalty-free license in and to
any copyright covering this article, along with the right to reproduce and to authorize others to
reproduce all or part of the copyrighted article.
DATA BANKS FOR RISK ASSESSMENT AT THE SAVANNAH RIVER SITE (U)

William S. Durant, C. Ray Lux, and Donna F. Baughman

ABSTRACT

The Savannah River Site maintains a compilation of operating problems and equipment failures that have occurred in the fuel reprocessing and other areas in the form of computerized data banks.

INTRODUCTION

One of the lessons learned from the explosion scenarios discussed in reference 1 is that mistakes of the past are soon forgotten if no method is available to retrieve and review these events. Savannah River Site has for many years maintained a system for recording, retrieving, and reviewing its incident history. The system is based on a series of data banks developed primarily for risk assessment. Six such banks exist for reprocessing, fuel fabrication, tritium, reactor, laboratory, and naval fuels facilities (Slide 1).

DISCUSSION

The original data bank was developed in 1973 for the SRS nuclear fuel reprocessing plants (including waste management facilities). Dates of entries range back to plant startup in 1953 and include equipment failures, process upsets, operating errors, facility contamination, personnel injuries, environmental insults, etc. Basically, if the event was of sufficient concern to record someplace, it was considered sufficiently important to abstract into the data bank. As of 1990, this data bank contains approximately one quarter million entries (Slide 2).

About 90 internal sources of data are routinely searched for information. These sources are either published; that is, any report that is typed, or unpublished; such as shift turnover log books that are hand written. Examples of published reports are operating incident reports, special hazards investigations, plant technical monthly reports, fire department reports, and criticality audits (Slide 3). Because the data bank contains abstracts rather than full
text, applicable sections of the source document are highlighted and coded to enable the data bank clerks to determine the information to be processed (Slide 4).

Examples of unpublished logs include senior supervisor log books, health protection log books, burial ground log books, and decontamination and maintenance log books (Slide 5). Approximately 25,000 pages are scanned annually for items of interest. Despite an occasional legibility problem, the logs are the most valuable source of the less significant events (Slide 6).

Each entry is coded to record the source of the data, the date of occurrence, and four sets of specifications to reflect which of the two reprocessing plants is applicable, the specific facility within that plant, the unit operation within the facility, and key words to reflect the specific occurrence (Slide 7). An almost unlimited number of plants, facilities, unit operations, and key words can be applied to a single entry (Slide 8). The repair time (the time between detection of a fault and restoration of the system) and the consequence where it can be expressed numerically are recorded in fields separate from the general text of the entry. Data may be sorted by any combination of the specifications using either "or", "and", or "not" logic. In addition, embedded words or phrases in the text may be specified.

Although the data bank was originally intended as a source of information for the probabilistic risk assessments performed at the Savannah River Laboratory, many other uses have been discovered. These include failure rate data, equipment breakdown histories, generic incident histories, trend analyses, training, audits, and incident investigations (Slide 9).

All incident investigations are required to be accompanied by a search of the data bank for similar events. This provides immediate evidence even to less experienced personnel whether a recurring problem exists. It also provides additional information for root cause analysis.

Where quantitative statistical information is required, such as for safety analysis reports, the data bank and its accompanying statistical analysis packages provide an invaluable resource (slide 10). Data for a given scenario is sorted to a named record in the computer library. A computer code named STATPAC-2 is evoked to react to the dates of the sorted information. STATPAC-2 determines the best fit distribution of the times-between-occurrences from normal, lognormal, Weibull, exponential, and log uniform equations. From the distribution, mean, median, and standard deviation values are calculated for the frequency of the event. In addition, plots of the data fit (Slide 11)
and trend as a function of time (Slide 12) are provided. Repair times and consequences (Slide 13) are calculated directly from the data bank based on the data recorded in specific fields.

The location of particularly vulnerable operations to any given event may also be determined directly from the data bank. For example, the overall frequency of a transfer error may be determined by sorting and analyzing the error itself; however, the most vulnerable location is immediately evident (Slide 14).

The data bank provides information necessary for reliability studies of process equipment by use of a Weibull analysis. The Weibull analysis was developed to predict the characteristic life of equipment in which some of the units had failed while others have not. For example, based on data contained in the bank for process agitators, the characteristic life is calculated to be 6040 days (Slide 15).

The cost of maintaining a data bank has through the years been of concern to a number of managers at other DOE sites. The initial 8000 entries were abstracted by five technical people over a four month interval. Because of significant enhancements to the system of data bank management, about 2/3 of one technical person is required for marking entries to be abstracted, editing, coding, and computer support. In addition, a data bank specialist and three clerks manage and support information flow and data processing (Slide 16). Some of the enhancements that have significantly reduced costs include abstracting onto a personal computer rather than manually, entering the data by electronic transfer rather than by punch cards, more reliance on clerical personnel rather than technical personnel, and interactive sorting rather than batch sorting (Slide 17).

A detailed history and description of the data bank is contained in an IEEE publication, Reference 2 (Slide 18). In addition, data on a number of types of process equipment have been published in DOE research and development reports including evaporators, manipulators, cranes, agitators, pumps, and centrifuges, References 3-8 (Slide 19). Data that are not already published can be obtained by contacting the authors; however, release of the data is subject to review and approval of the US Department of Energy. Unpublished data do not represent official records of specific events nor are they intended to include information of a personal and confidential nature; eg, personnel radiation and medical records.

Some typical examples of information contained in the data bank include data on robots (Slide 20), fires (Slide 21),
instrument pluggage (Slide 22), criticality potential (Slide 23), and computers (Slide 24).

The validity of the data bank depends heavily on the coding of the entries. Improperly coded data can provide erroneous results. It is important that the data be consistently coded. At present, each facility has an individual responsible for the coding of the data from that facility. Therefore, a thorough understanding of the coding techniques and the meaning of the various codes is limited to a few individuals. To maintain the integrity of the data bank, it is imperative that this knowledge be captured for future use. The use of artificial intelligence is being considered. We anticipate that an expert system can be developed to encompass the present knowledge about coding of the data and provide helpful assistance to individuals attempting to use the data.

The introduction of personal computers to the data extraction process has greatly simplified the task. It now appears that another giant step is on the threshold. IBM has developed voice recognition software for the personal computer. The software allows direct conversion of speech to text. The computer is first educated with a vocabulary using the operator’s voice. Once the computer is trained, the operator is able to produce data entries by merely speaking them. The software is being evaluated to determine if it meets all of our requirements. (Slide 25).

In conclusion, the data banks have been invaluable resources to the safety analysis and risk management effort at Savannah River. We anticipate that the banks will continue to grow and future developments will be forthcoming to further reduce the cost and increase the utilization.

REFERENCES


ACKNOWLEDGMENT

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.
DATA BANKS FOR RISK ASSESSMENT AT SRS

W. S. DURANT

<table>
<thead>
<tr>
<th>BANK</th>
<th>NUMBER OF ENTRIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 AREA</td>
<td>200,000</td>
</tr>
<tr>
<td>300 AREA</td>
<td>19,000</td>
</tr>
<tr>
<td>TRITIUM</td>
<td>10,000</td>
</tr>
<tr>
<td>100 AREA</td>
<td>5,000</td>
</tr>
<tr>
<td>SRL</td>
<td>3,000</td>
</tr>
<tr>
<td>NAVAL FUELS</td>
<td>300</td>
</tr>
</tbody>
</table>

SLIDE #2

200 AREA FAULT TREE DATA BANK

☐ MAINTAINED SINCE 1973 WITH DATA RANGING BACK TO 1953

☐ CONTAINS > 200,000 ENTRIES

☐ ENTRIES INCLUDE EQUIPMENT FAILURE, PERSONNEL ERROR, PROCESS UPSETS, ETC.

☐ ABOUT 70 INTERNAL SOURCES OF DATA ARE ROUTINELY ABSTRACTED
SELECTED PUBLISHED SOURCES OF DATA

- OPERATING INCIDENT REPORTS
- SPECIAL HAZARDS INVESTIGATIONS
- PLANT TECHNICAL MONTHLY REPORTS
- DAILY TELETYPES
- FIRE DEPARTMENT REPORTS
- WORKS ENGINEERING MONTHLY REPORTS
- WASTE MANAGEMENT MONTHLY REPORTS
- CRITICALITY AUDITS
- POWER DEPARTMENT INCIDENT REPORTS
SLIDE # 4

MARCH 5, 1985

TO: T. A. MOORE, 703-A
FROM: I. K. SULLIVAN, 703-H
R. J. VERO, 703-F

H-AREA SWE-ES DAILY REPORT

PERSONNEL

S. R. GRUNDY - Attended the final new employee orientation today. Health Protection and Security were the topics of discussion.

BUSINESS
221-H

QUICKSET PAN/TILT - D. C. DEL VECCHIO - E & I is continuing to wire the new connectors and install them in the third Quickset Pan/Tilt. Probable completion and installation on the Hot Crane is by 3/8/85.

10 TON HOIST FLEXIBLE COUPLING - J. W. WONG - SWE-ES and Maintenance will install flexible coupling on 8-4 shift, 3/6/85.

CRANE LUBRICATION - J. W. WONG - Necessary lubricants for maintenance of 221-F&H Hot and Warm Cranes have been ordered per scope of work found in SWE-ES Crane Lubrication Evaluation memo.

HOT CRANE - D. C. DEL VECCHIO/J. W. WONG - E & I repaired the south monorail drifting problem. The brake gear was slipping and the problem was resolved by installing a new keyway.

WARM CRANE - D. C. DEL VECCHIO/J. W. WONG - Operation Routine.

IMPROVED SPECIFICATIONS DISSOLVER LID GASKET - B. A. SHINN - Contacted Purchasing to determine current vendor and specifications for 6.4 dissolver lid gasket. Purchasing does not have records of current vendor, and material specifications would not be located. Investigation will continue to determine this information. Use of an

NUCLEAR PROCESSES SAFETY RESEARCH
SAVANNAH RIVER LABORATORY
SLIDE # 5

SELECTED UNPUBLISHED SOURCES OF DATA

☐ SENIOR SUPERVISOR LOG BOOKS
☐ HEALTH PROTECTION DEPT. LOG BOOKS
☐ BURIAL GROUND LOG BOOKS
☐ WASTE MANAGEMENT LOG BOOKS
☐ SALVAGE YARD RECEIPT RECORDS
☐ CANYON CRANE LOG BOOKS
☐ DECONTAMINATION AND MAINTENANCE LOG BOOKS
LOG BOOK ENTRIES

✓ Attempted to stop #5 filters on #3 C.W.
  that was unmanaged.  v t.o.

✓ Live feed port to A.G unit off W.C. crane.
  Salt not moving
  Sparged first in H.C. & S.P.
  OT personnel warned in W.C. Seam.

✓ Blew down 7.7E traps:
  Regained contact all on.
  Worked on "C" shut tunnel.

✓ Regained H4 in Assapell Area.
  and inks and trim pieces.
SLIDE # 7

SORT OPTIONS

- PLANT AREA
- FACILITY
- UNIT OPERATION
- KEY WORD
- SOURCE OF INFORMATION
- "AND" OR "NOT" LOGIC
- DATE OR RANGE OF DATES
- EMBEDDED WORDS OR PHRASES IN TEXT
ANATOMY OF A DATA ENTRY

SPECIFICS: VENTILATION, FAN, BEARING

FACILITY: CANYONS

AREA: F

OPERATION: VENTILATION

ACCESSION NUMBER

INFORMATION SOURCE

DATE OF OCCURRENCE

292-F, NO 1 CANYON EXHAUST FAN OUTBOARD FAN BEARING FAILED. PILLOW BLOCK DAMAGED. 9 DAYS REPAIR TIME.

REPAIR TIME

NUCLEAR PROCESSES SAFETY RESEARCH
SAVANNAH RIVER LABORATORY
SLIDE #9

APPLICATIONS OF FAULT TREE DATA BANKS

- FAILURE RATE DATA
- EQUIPMENT BREAKDOWN HISTORIES
- GENERIC INCIDENT HISTORIES
- DATA FOR SYSTEMS ANALYSES AND SAFETY ANALYSIS REPORTS
- DATES OF SPECIFIC INCIDENTS
- DATA FOR DESIGN STUDIES
- DATA FOR QUALITY ASSURANCE STUDIES
- TREND ANALYSES
- DATA FOR PROJECT JUSTIFICATION

SLIDE #10

QUANTITATIVE STATISTICAL INFORMATION GENERATED FROM DATA BANK

- FREQUENCY OF EVENTS
  - FITTED TO STANDARD DISTRIBUTION (LOGNORMAL, WEIBULL, ETC.)
  - CALCULATES MEAN, MEDIAN, STD. DEVIATION VALUES
  - PROVIDES TREND PLOT

- REPAIR TIMES FOR EQUIPMENT
  - CALCULATED DIRECTLY FROM DATA BANK

- CONSEQUENCES OF ACCIDENTS
  - CALCULATED DIRECTLY FROM DATA BANK

NUCLEAR PROCESSES SAFETY RESEARCH
SAVANNAH RIVER LABORATORY
FREQUENCY OF TIME BETWEEN OCCURRENCES
OBSERVED DATA FITTED BY WEIBULL DISTRIBUTION CURVE
F CANYON TRANSFER ERRORS

NUCLEAR PROCESSES SAFETY RESEARCH
SAVANNAH RIVER LABORATORY
SLIDE 12

NO. OF OCCURRENCES OVER OBSERVATION PERIOD

F CANYON TRANSFER ERRORS

NUCLEAR PROCESSES SAFETY RESEARCH
SAVANNAH RIVER LABORATORY
SLIDE # 13

MASSES OF MATERIALS INVOLVED
IN TRANSFER ERRORS*

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>MEAN, LB</th>
<th>MEDIAN, LB</th>
<th>90% ERROR BOUNDS, LB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canyon Process material</td>
<td>3,170</td>
<td>2,460</td>
<td>434 - 9,000</td>
</tr>
<tr>
<td>Chemicals</td>
<td>14,620</td>
<td>2,865</td>
<td>133 - 72,250</td>
</tr>
<tr>
<td>Water</td>
<td>36,290</td>
<td>2,920</td>
<td>252 - 290,000</td>
</tr>
<tr>
<td>Ion exchange material</td>
<td>280</td>
<td>94</td>
<td>16 - 2,720</td>
</tr>
</tbody>
</table>

SLIDE # 14

TRANSFER ERRORS --
CANYON SYSTEM IN WHICH ERROR WAS INITIATED

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>NUMBER OF RECORDED OCCURRENCES 1961-1986</th>
<th>FREQUENCY, OCCURRENCES/HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold Chemicals</td>
<td>45</td>
<td>2 x 10^-4</td>
</tr>
<tr>
<td>Dissolving</td>
<td>14</td>
<td>6 x 10^-5</td>
</tr>
<tr>
<td>Ion Exchange</td>
<td>14</td>
<td>6 x 10^-5</td>
</tr>
<tr>
<td>Solvent Extraction</td>
<td>13</td>
<td>6 x 10^-5</td>
</tr>
<tr>
<td>Evaporation</td>
<td>12</td>
<td>5 x 10^-5</td>
</tr>
<tr>
<td>FB-Line</td>
<td>10</td>
<td>4 x 10^-5</td>
</tr>
<tr>
<td>Solvent Recovery</td>
<td>5</td>
<td>2 x 10^-5</td>
</tr>
<tr>
<td>Sumps</td>
<td>4</td>
<td>2 x 10^-5</td>
</tr>
<tr>
<td>Waste Disposal</td>
<td>4</td>
<td>2 x 10^-5</td>
</tr>
<tr>
<td>211-F</td>
<td>2</td>
<td>9 x 10^-6</td>
</tr>
<tr>
<td>Head End</td>
<td>1</td>
<td>4 x 10^-6</td>
</tr>
<tr>
<td>Drain Header</td>
<td>1</td>
<td>4 x 10^-5</td>
</tr>
<tr>
<td>Bucket Storage</td>
<td>1</td>
<td>4 x 10^-6</td>
</tr>
<tr>
<td>Not Identified</td>
<td>2</td>
<td>9 x 10^-4</td>
</tr>
</tbody>
</table>

TOTAL 128 6 X 10^-4

NUCLEAR PROCESSES SAFETY RESEARCH
SAVANNAH RIVER LABORATORY
FIGURE 4. Weibull Failure Analysis of F-Canyon Agitators
PERSON POWER

☐ 2/3 OF ONE TECHNICAL PERSON
☐ MARKING ENTRIES TO BE ABSTRACTED
☐ EDITING
☐ CODING
☐ COMPUTER SUPPORT

☐ 1 DATA BANK SPECIALIST
☐ 3 DATA BANK CLERKS
COMPARISON OF 1974 AND 1987 DATA MANAGEMENT PRACTICES

<table>
<thead>
<tr>
<th>1974</th>
<th>1987</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA BANK CAPACITY 99,999</td>
<td>DATA BANK CAPACITY 999,999</td>
</tr>
<tr>
<td>DATA ABSTRACTED BY HAND</td>
<td>DATA ABSTRACTED BY IBM PC</td>
</tr>
<tr>
<td>DATA ENTERED TO MAIN-FRAME VIA PUNCHED CARDS</td>
<td>DATA ENTERED TO MAIN-FRAME VIA ELECTRONIC TRANSFER</td>
</tr>
<tr>
<td>PUNCHED CARD BACKUP FILE</td>
<td>MULTIPLE MAGNETIC TAPE BACKUP FILES</td>
</tr>
<tr>
<td>MANUAL DATA COMPRESSION</td>
<td>COMPUTER DATA COMPRESSION</td>
</tr>
<tr>
<td>DATA PROCESSED BY EXEMPT TECHNICAL PERSONNEL</td>
<td>DATA PROCESSED BY NON-EXEMPT CLERICAL PERSONNEL</td>
</tr>
<tr>
<td>MANUAL STATISTICAL ANALYSIS</td>
<td>COMPUTER STATISTICAL ANALYSIS</td>
</tr>
<tr>
<td>BATCH SORTING</td>
<td>INTERACTIVE SORTING</td>
</tr>
</tbody>
</table>

NUCLEAR PROCESSES SAFETY RESEARCH
SAVANNAH RIVER LABORATORY
SLIDE # 18

HISTORY AND DESCRIPTION OF DATA BANK


---

SLIDE # 19

PUBLICATIONS CONTAINING DATA


** Includes failure rate analysis

NUCLEAR PROCESSES SAFETY RESEARCH
SAVANNAH RIVER LABORATORY
<table>
<thead>
<tr>
<th>Occurrence</th>
<th>Date</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:25 PM, WHEN A AIR LINE ON ROBOT BROKE: 4-12</td>
<td>03-18-80</td>
<td>79245</td>
</tr>
<tr>
<td>AIR LINE TO THE ROBOT CAME OFF AT 10:49 PM, 4-12, 3 SHIFTS.</td>
<td>05-01-80</td>
<td>79259</td>
</tr>
<tr>
<td>PRESSURE WAS LOST, AND THE ROBOT NEEDED TO BE OPERATED. 4-12</td>
<td>05-27-80</td>
<td>79235</td>
</tr>
<tr>
<td>PRESSURE REGULATED TO DIE LOADER STARTED LEAKING. LEAK WAS 50 BD THAT</td>
<td>05-27-80</td>
<td>79235</td>
</tr>
<tr>
<td>ROBOT SLIPPED SEVERAL TIMES AND WAS REPOSITIONED. 4-12</td>
<td>02-26-80</td>
<td>79210</td>
</tr>
<tr>
<td>THE SHORT PLATE ON LOADER MOUNTING COOLER, 4-12</td>
<td>02-28-80</td>
<td>79023</td>
</tr>
<tr>
<td>THE ROBOT STOOD ABOUT 10 DEGREES BACKWISE. MICE: 2-4</td>
<td>02-28-80</td>
<td>79021</td>
</tr>
<tr>
<td>THE ROBOT MOVES EVEN AT TIMES. 4-12</td>
<td>02-28-80</td>
<td>79020</td>
</tr>
<tr>
<td>THE ROBOT NEEDS TO MAKE AN AIR PUMP AT ROBOT REPAIRED OR REPAIRED. 4-12</td>
<td>02-28-80</td>
<td>79020</td>
</tr>
<tr>
<td>WEEXPERIENCED SOME TROUBLE WITH ROBOT. WOULD NOT RESTART ARMS. 4-12</td>
<td>02-28-80</td>
<td>79091</td>
</tr>
<tr>
<td>POWER WAS SPILLED WHEN THE ROBOT MISSED THE TROLLEYS WITH THE DIE. 4-12</td>
<td>02-28-80</td>
<td>79179</td>
</tr>
<tr>
<td>MOTOR REPLACED. MERCHANT STOP AT ROBOT. 4-12</td>
<td>02-28-80</td>
<td>79178</td>
</tr>
<tr>
<td>ASKS MERCHANT TO REPLACE MERCHANT STOP AT ROBOT. 4-12</td>
<td>02-28-80</td>
<td>79172</td>
</tr>
<tr>
<td>BEING TIGHTENED. IT CAME OFF. 4-12, 2 SHIFTS.</td>
<td>02-28-80</td>
<td>79172</td>
</tr>
<tr>
<td>THE ROBOT MOUNTED TO THE MOUNTING. WHEN THE BOTTOM OF THE ROBOT WAS</td>
<td>02-28-80</td>
<td>79169</td>
</tr>
<tr>
<td>ADJUSTED AND THE ROBOT WAS REPOSITIONED. WHEN THE TOP ANCHOR NUT WAS</td>
<td>02-28-80</td>
<td>79154</td>
</tr>
<tr>
<td>THE ROBOT ARISES TO WCOOLE WITH A LATCH. WHEN THE MOUNT Did NOT</td>
<td>02-28-80</td>
<td>79115</td>
</tr>
<tr>
<td>ROBOT ADJUSTED TO THE MOUNT. WHEN THE ROBOT WAS CORRECTLY BECAUSE THE</td>
<td>01-12-80</td>
<td>79100</td>
</tr>
</tbody>
</table>

Range of Dates: 01/1980 to 05/1980
AIRBORNE IN MLD 1. 51-08-7.4.

COMPRESSED GAS OF CARBON (CON) MAY BE CONTAINING WITH CARBON FROM SOOT. 2125KC

47615 27.28.28.04.39. 07-21-80

47616 27.28.28.04.39. 07-21-80

DISCHARGE MATERIAL.

BELIEVED TO HAVE STAINED AS A RESULT OF A CHEMICAL REACTION FROM

BURNING OR OPERATOR USE OF PRESSURE. CHAMBER WAS LEFT

PLASTIC VACUUM CLEANER IN THE MECHANICAL LINE PRESSURE CHAMBER WAS LEFT

A PICTURE COPIED IN A CLEAN NIPPLE LOCATED NEAR 227-6. THE FIRE IS

ON A HOT EXHAUST MANIFOLD.

FAILURE OF A PASSAGE IN THE FUEL FILTER WHICH RESULTED IN FUEL SPILLING

PVC. ALS SUNK. 36.50.50-4.4. 07-21-0-320. 10460-1450-1495F-4946-3

AND BREAKS TO WETBED. 25-0.50-4-50. 07-21-0-320. 10460-1450-1495F-4946-3

FIRE EXTINGUISHED IN VITAMIN OF OILSOIL. POTENTIAL FOR CONTAMINATION

PLASTIC PIPES AND COMBUSTION OF 1.35. FT. OF OIL PLASTICS. FIRE WAS

MAINTAINING FRESH IN THE ROOM. ON 12 JULY 6.12. THE FIRE CAUSED IRRIGATION

OF THE MECHANICAL LINE PRESSURE CHAMBER, LEFT IN CONTACTING.

THE OLD IGNITION

THE WOOD BURNING THE LUBRICATION OF THE OIL CASE BREAKS THE SEAL AND

HEAT IN THE BARK AMOUNT THE AREA AND IN THE AREA AND AREA AREA. 4-

TAILFIRE. SOME PLANTS IN THE SAME AREA AND IT FALLS ON THE AREA.

1047-10-10.8. 1047-10-10. 1047-10-10. 1047-10-10.

INSTALL ACTIVATING ALTERNATE FIRE SUPPRESSION SYSTEM.

1047-10-10. 1047-10-10. 1047-10-10. 1047-10-10.

PEF MAIN RM. 14 APP. 10.00 AM, FIRE ALARM BOX NO. 33 SOUNDED.

NO. SOURCE DATE OCCURRENCE

RANGE OF DATES: 01/1980 TO 12/1980

SPECIFICS: FIRE

OPERATION: F I R E S

AREA: 320 AREA
AND U-COLORMETER NEEDS REPAIRS - WILL NOT RESPOND. 12-8
12.7. DOWN, TOOK OVER 1 IR TO AND DELTA P. 6.12
TESTED 60% 1-AHPA SWIRL CELLS 7.12-
10 TO 15-80
15.8 TO 4.0. SHADIED WITH BORNEIXE RATES OF 1,000
105-FT DEEP TANK 10.8
SHADIED IN LUnivers. 20.8
SHADIED - SP. ENTERED SHADIED AND SELECTED A MERCURY SWITCH ON TOP OF
REPAIRING CAM IN HOT CLEAN CAV
ELE RAPID RED MACHINE IN CONTROL ROOM.
ELE RAPID RED MACHINE IN CONTROL ROOM.
ELE RAPID RED MACHINE IN CONTROL ROOM.
ELE RAPID RED MACHINE IN CONTROL ROOM.
ELE RAPID RED MACHINE IN CONTROL ROOM.
ELE RAPID RED MACHINE IN CONTROL ROOM.
ELE RAPID RED MACHINE IN CONTROL ROOM.

SECOND VARNISHING CYCLE. 1.5 HRS. DOWN TIME MENDED FROM 12-8
15.8 TO 15.8. IF FEED LET.
STARTING TIME OF THE CYCLE WAS ESTIMATED APPROXIMATELY 10 HRS. DUE TO PLUGGED
Neill LI, RECORDING LI IS ON THE ORDER. MONITOR THE SP. LEVEL. 6.12
STEAM ALWY 7.6 SP. OR DIP TUBES TO REMOVE PLUGGE
STEAM ALWY 7.6 SP. OR DIP TUBES TO REMOVE PLUGGE
STEAM ALWY 7.6 SP. OR DIP TUBES TO REMOVE PLUGGE

REPLACEMENT
22 HOURS FOR TANK 101-86. 22 HOURS FOR TANK 41. 12 HOURS.
REPAIRS. 22 HOURS FOR TANK 101-86. 22 HOURS FOR TANK 41. 12 HOURS.
22 HOURS FOR TANK 101-86. 22 HOURS FOR TANK 41. 12 HOURS.
22 HOURS FOR TANK 101-86. 22 HOURS FOR TANK 41. 12 HOURS.
22 HOURS FOR TANK 101-86. 22 HOURS FOR TANK 41. 12 HOURS.

RANGE OF DATE: 01/1980 TO 02/1985
SPECIFICS: INSTRUMENT MALFUNCTION
AREA: X
NO. SOURCE OCCURRENCE DATE
202301 76, ' 
01-15-07

202500 76, ' 
01-15-07

217120 71, ' 
01-15-07

217127 71, ' 
01-15-07

Product Ll Ack Reading Incomplete. 12-8.

Second Pu Circle - Circle Down All Shifting, Due to Power Problems. All

Second Pu Circle - Circle Down All Shifting, Due to Power Problems.


Second Pu Circle. The 12.5 Sample Unit on Proxay is not Operating.

229255 72, ' 
01-09-07

329839 73, ' 
01-09-07

6-8 - Computer Group Worked on P-190. 8-4.

229260 75, ' 
01-09-07

6-8 - Values No. 1 and No. 2. Ann Reactor. and 0-2 Activator Do Not Operate

217399 71, ' 
01-09-07

Only Two Alpha Counters Available, This Shift. High Backgrounds Continue

200347 76, ' 
01-09-07

721-PU Computer Problems.

118434 72, ' 
01-09-07

数据分析: 10/1987 10/04/1987

SPECIFICS: COMPUTER
FUTURE SYSTEM IMPROVEMENTS

* Develop lexicon for fault tree failure rate, consequence, and repair time data with auto-input from data banks.
* Use of artificial intelligence for coding entries.
* Voice activated system for data entry.
* Direct access of data to other DOE sites.

NUCLEAR PROCESSES SAFETY RESEARCH
SAVANNAH RIVER LABORATORY