WHC-SP-0081-22

# Fast Flux Test Facility Performance Monitoring Management Information May 1989

Prepared for the U.S. Department of Energy
Assistant Secretary for Nuclear Energy

Westinghouse
Hanford Company Richland, Washington

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

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D. J. Newland

Date Published
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# FOREWARD

The purpose of this report is to provide management with performance data on key performance indicators selected from the FFTF Early Warning System performance indicators. This report contains the results for key performance indicators divided into two categories of "overall" and "other". The "overall" performance indicators, when considered in the aggregate, provide one means of monitoring overall plant performance. Overall performance indicators are listed in Table 1. The "other" performance indicators, listed in Table 2, are considered useful management tools for assessing the specific areas they address.

The data should be used in conjunction with the results of other management assessment activities to focus improvement efforts. Use of these key performance indicators as a group is stressed, since focusing on a single indicator or a narrow set of indicators can be counterproductive both to safety and to long-term performance improvement.

Any concerns regarding the accuracy or analysis of the specific indicator should be addressed to the responsible manager identified on the figure. This report must be reviewed with the understanding that both the design and the mission are different for FFTF compared to commercial power reactors.

FFTF PLANT MANAGER'S ASSESSMENT

MAY 1989

The plant was started up for the P11A-1 Operating Cycle on May 3, 1989, one and one half days late due to problems with the D-14 ZTO motor generator. The plant was shut down May 16 to install the Multi-Isotope Production (MIP) experiment cluster. The subsequent startup on May 21 for the P11A-2 Operating Cycle went very well.

In general, Overall Performance Indicators showed excellent plant performance. There were no unplanned automatic scrams, forced outages, unusual occurrence reports or recordable injuries. The corrective maintenance backlog greater than three months old increased slightly during May due to a decrease in the total number of corrective maintenance items and the concentration of Engineering resources needed to support timely insertion of the Fusion MOTA in the reactor.

Among the Other Performance Indicators, FFTF direct staffing and total Operations staffing have increased slightly, bringing them closer to authorized staffing levels. The protective maintenance backlog recovered from last month's increase, dropping to a post-outage record low of 1.20%. By month's end, the value was reduced further to 1.15% (goal <1.2%). All other indicators are satisfactory.

As part of our ongoing effort to continually improve the usefulness of this report, a new graph that monitors overtime usage of the operating crews has been added to the Other Performance Indicators. This is an indicator of the ability of Operations to support scheduled activites with on-crew staff.

Please route your copy of this report to your staff and direct any questions or comments to J. E. Truax (376-0758).

DJ Newland

D. J. Newland
FFTF Plant Manager

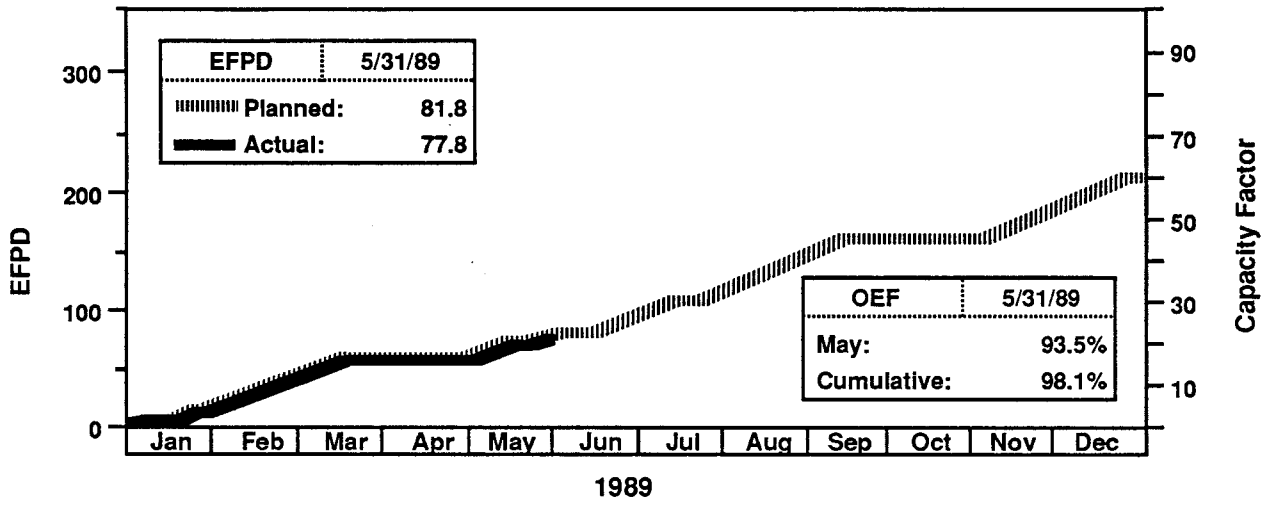
TABLE 1

OVERALL PERFORMANCE INDICATORS

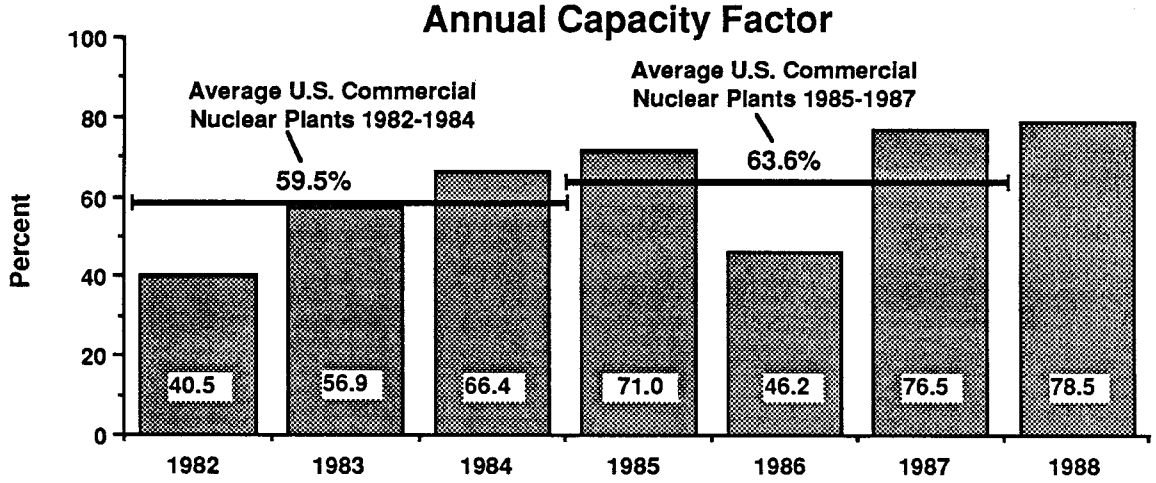
| FIGURE | PERFORMANCE INDICATOR | AREA |
|---|---|---|
| 1 | Capacity Factor | OPS |
| 2 | Unplanned Automatic Scrams | OPS |
| 3 | Forced Outages | OPS |
| 4 | Unusual Occurrence Reports | OPS |
| 5 | Personnel Radiation Exposure | RADCON |
| 6 | Industrial Safety Statistics | INDSAF |
| 7 | Corrective Maintenance Workoff Rate | MAINT |

# Capacity Factor

## Annual Capacity Factor




## Annual Capacity Factor




## Purpose

To monitor the plant's ability to perform at rated power. Capacity Factor is defined as the actual EFPD divided by the product of the calendar days in the reporting period times the Maximum Dependable Capacity (MDC) for the period. The MDC for CDE cycles is 1.0. For cycles prior to September 1986, the MDC was 0.973.

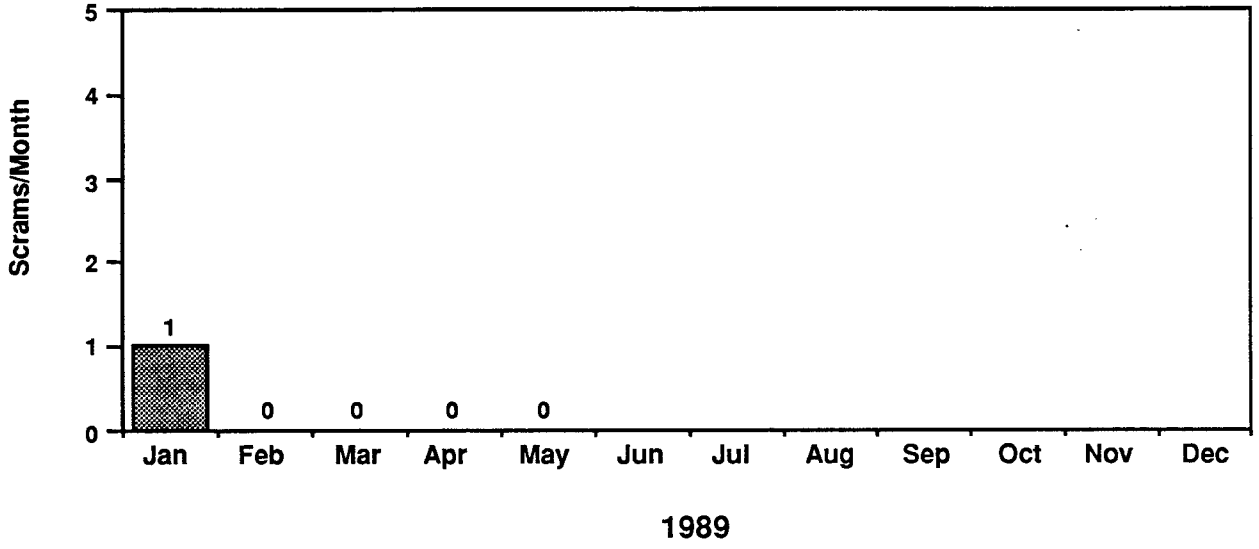
## Assessment

The Capacity Factor for the month of May was 66.6%. The reactor was started up on 5/3/89 for the P11A Operating Cycle. The reactor was shutdown from 5/16/89 through 5/21/89 to install the MIP experiment.

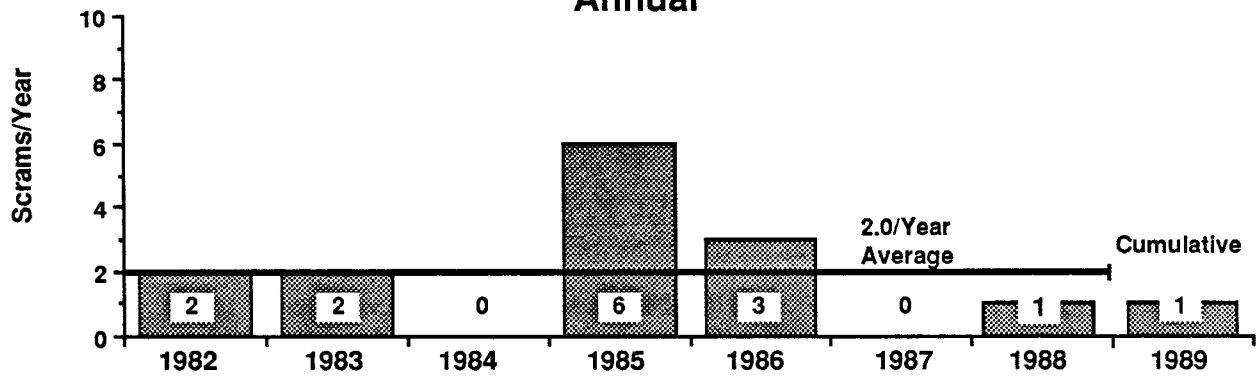
| | | | |
|---|---|---|---|
| May 1989 | D. J. Swaim | 376-0604 | Figure 1 |

# Unplanned Automatic Scrams

## Monthly




## Annual




## Purpose

To monitor the number of unplanned automatic scrams that occur while the reactor is critical. Unplanned means that the scram was not part of a planned operation or test. Unplanned automatic scrams include, for example, automatic scrams resulting from a transient, an equipment failure, a spurious signal, or human error.

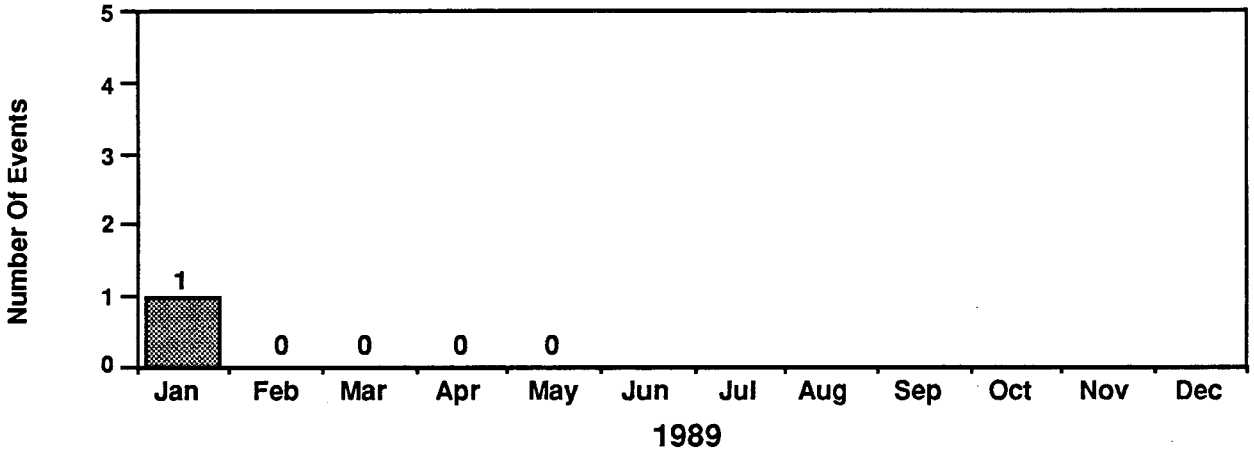
## Assessment

There were no unplanned automatic scrams during the month of May.

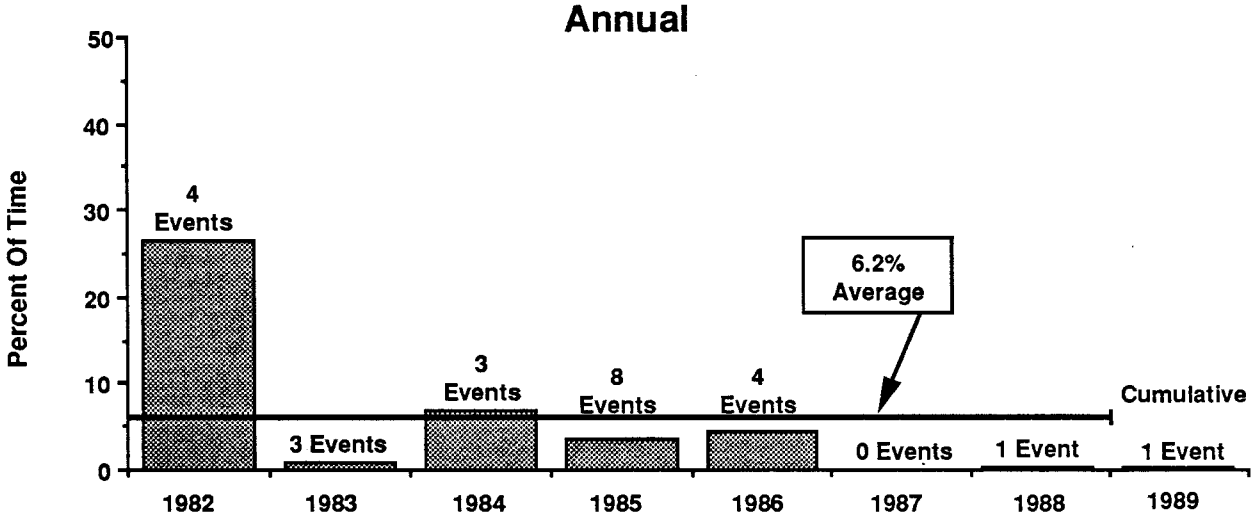
| | | | |
|---|---|---|---|
| May 1989 | D. J. Swaim | 376-0604 | Figure 2 |

# Forced Outages

## Monthly




## Annual




## Purpose

To monitor the percentage of time that the reactor was not available for irradiation testing due to a forced shutdown. A forced shutdown is one that would not have been completed in the absence of the condition for which corrective action was taken. Test outages are not considered forced shutdowns.

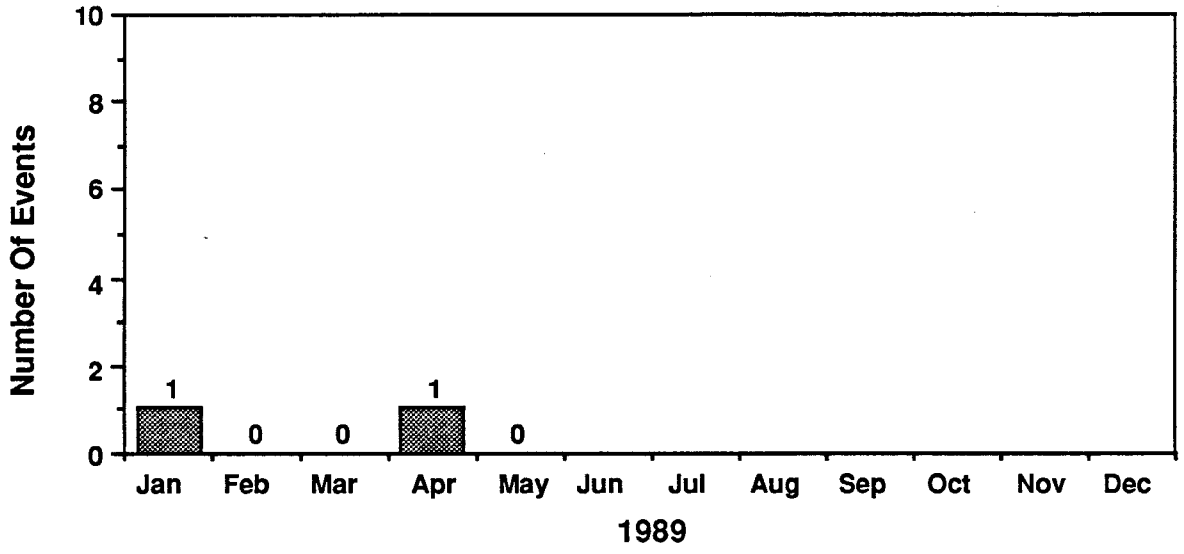
## Assessment

There were no forced outages during the month of May.

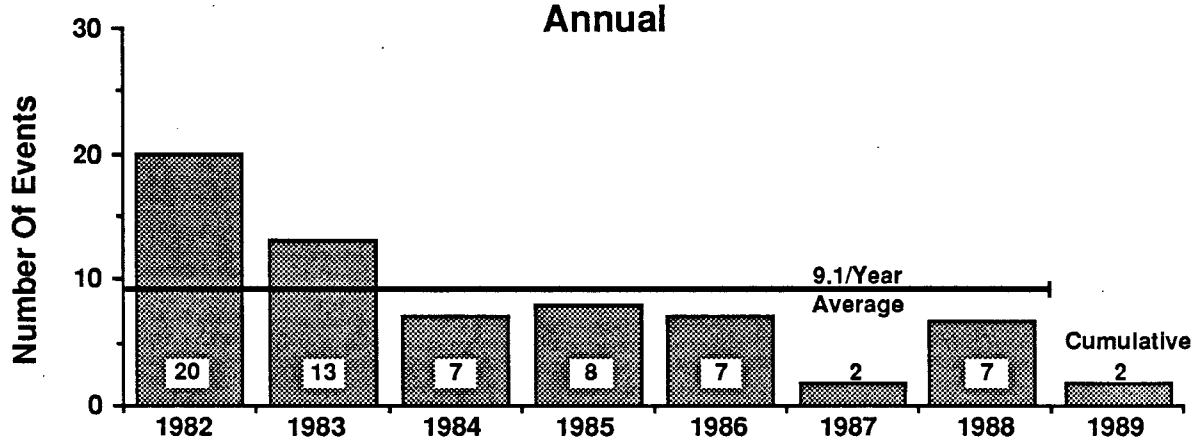
| | | | |
|---|---|---|---|
| May 1989 | D. J. Swaim | 376-0604 | Figure 3 |

# Unusual Occurrence Reports

## Monthly




## Annual




## Purpose

To monitor the number of Unusual Occurrence Reports (UOR). A UOR is an event outside normal operations that causes or risks serious injury to personnel, serious threat to the environment, or has significant effect upon safety, reliability or cost of FFTF or FFTF programs.

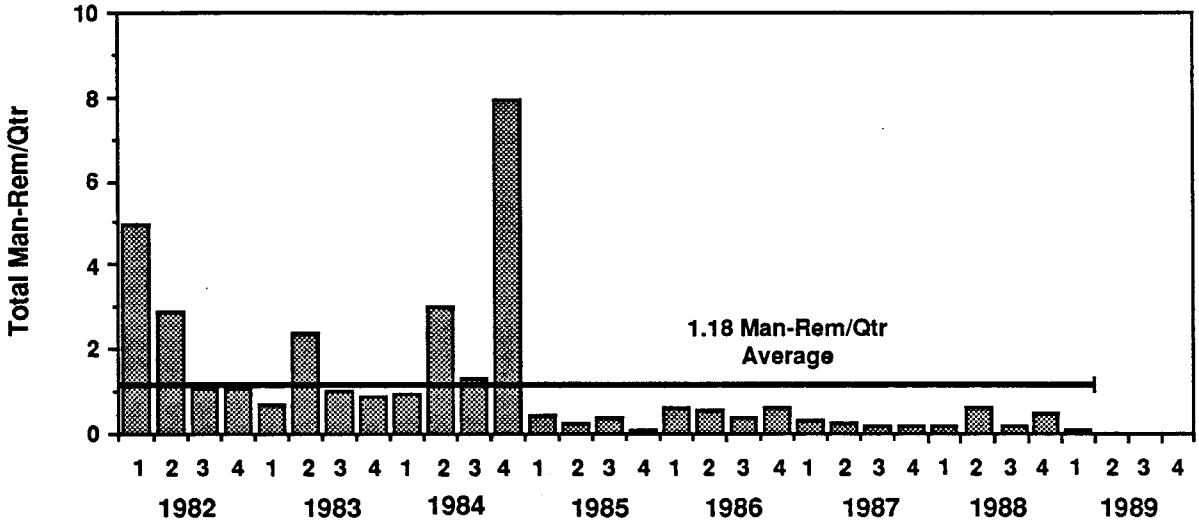
## Assessment

There were no Unusual Occurrence Reports this month.

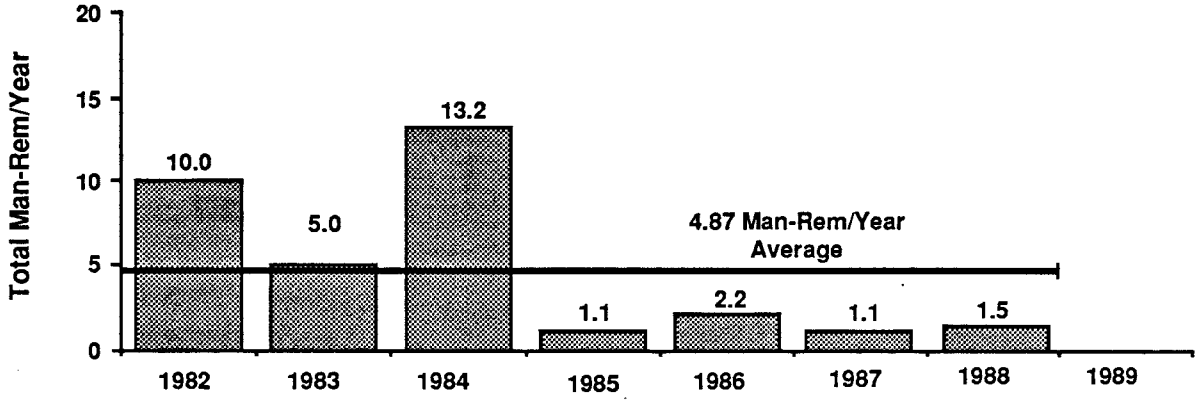
| | | | |
|---|---|---|---|
| May 1989 | D. J. Swaim | 376-0604 | Figure 4 |

# Personnel Radiation Exposure

## Quarterly Man-Rem Exposure




## Annual Man-Rem Exposure




## Purpose

To monitor the quarterly radiation exposure to the FFTF radiation workers. Due to the very low exposures, data is collected and reported quarterly. Annually and semi-annually reported exposures are included in the fourth quarter statistics for 1988.

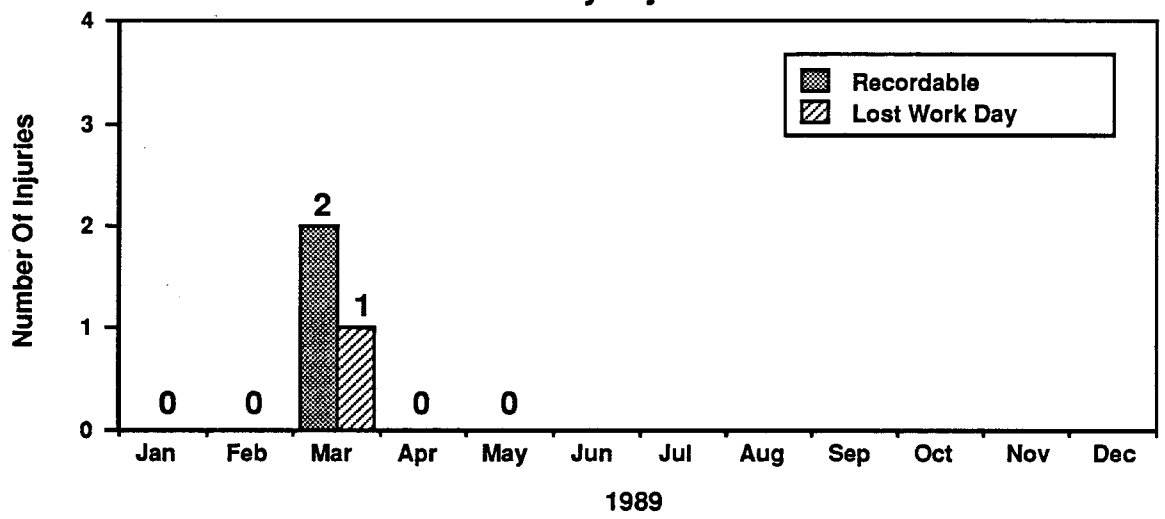
## Assessment

Plant personnel radiation exposure during the first quarter of 1989 remained very low. The highest individual exposure was 40 mrem. With 191 radiation workers reporting on a quarterly basis at FFTF, the average exposure was less than 4 mrems per worker per quarter.

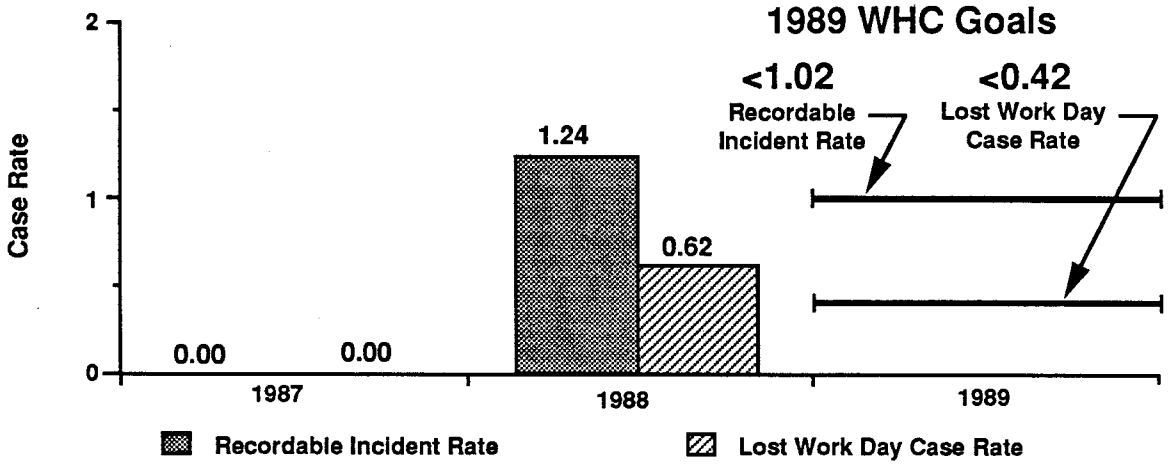
| | | | |
|---|---|---|---|
| May 1989 | P. R. Prevo | 376-5667 | Figure 5 |

# Industrial Safety Statistics

## Monthly Injuries




## Annual Case Rates




## Purpose

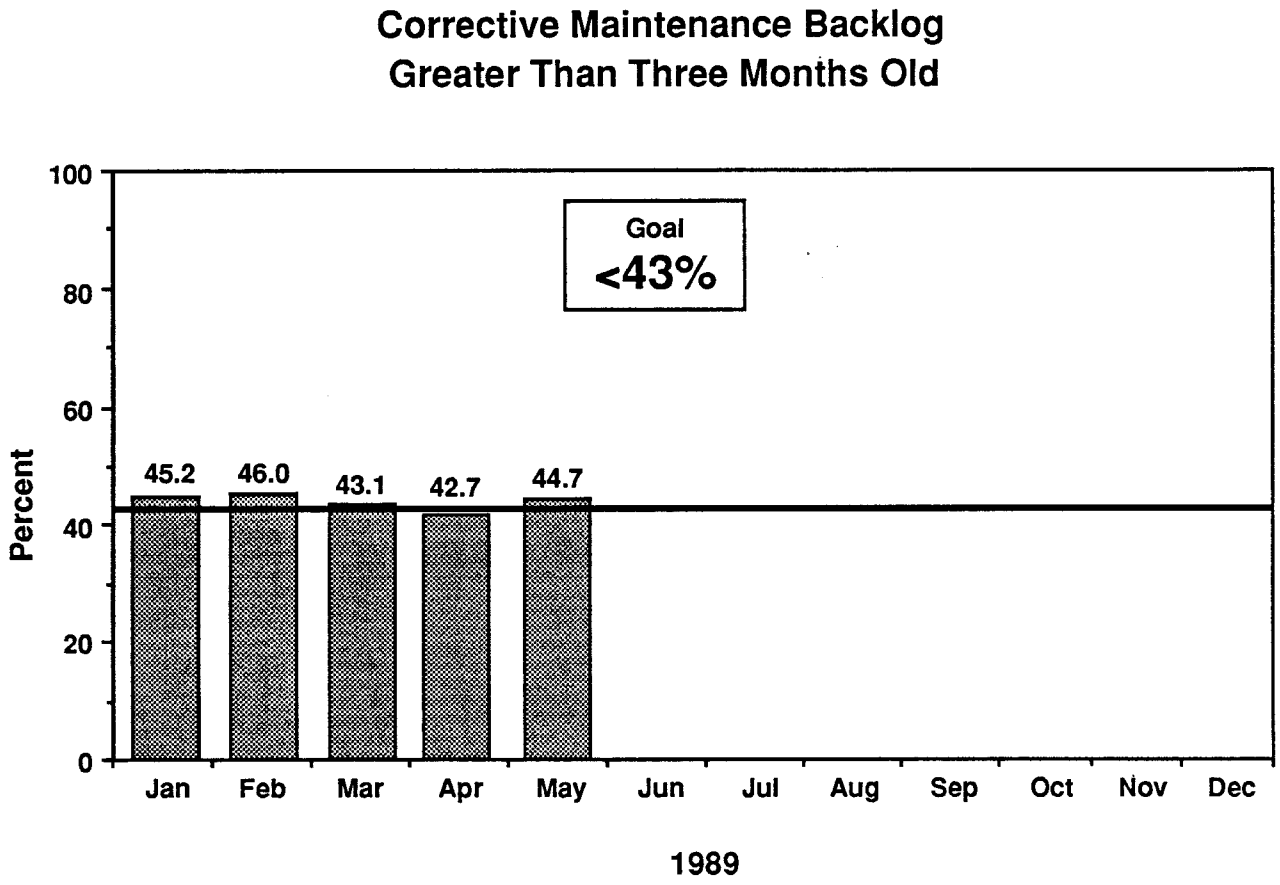
To monitor the number of recordable and lost work day injuries. The lost work day injury incident rate (the number of lost time injuries per 200,000 employee-hours) and the recordable injury incident rate (the number of OSHA recordable injuries per 200,000 employee-hours) are also monitored for permanent site personnel.

## Assessment

There were no OSHA recordable injuries during the month of May.

| | | | |
|---|---|---|---|
| May 1989 | H. N. Bowers | 376-3070 | Figure 6 |

# Corrective Maintenance Workoff Rate




## Purpose

To monitor the rate of completion of corrective maintenance items. This chart indicates the efficiency of the FFTF work control process and the staff's ability to follow through on the disposition, scheduling, field work, and close out of corrective maintenance.

## Assessment

The backlog greater than three months old increased to 44.7% during the month of May. This parameter is fairly volatile and highly dependent on the total number of corrective maintenance items. Since the total number dropped, this parameter experienced an increase. Also, Engineering resources are becoming somewhat limited due primarily to Fusion MOTA and are not available to disposition corrective maintenance items.

| | | | |
|---|---|---|---|
| May 1988 | R. D. Redekopp | 376-9668 | Figure 7 |

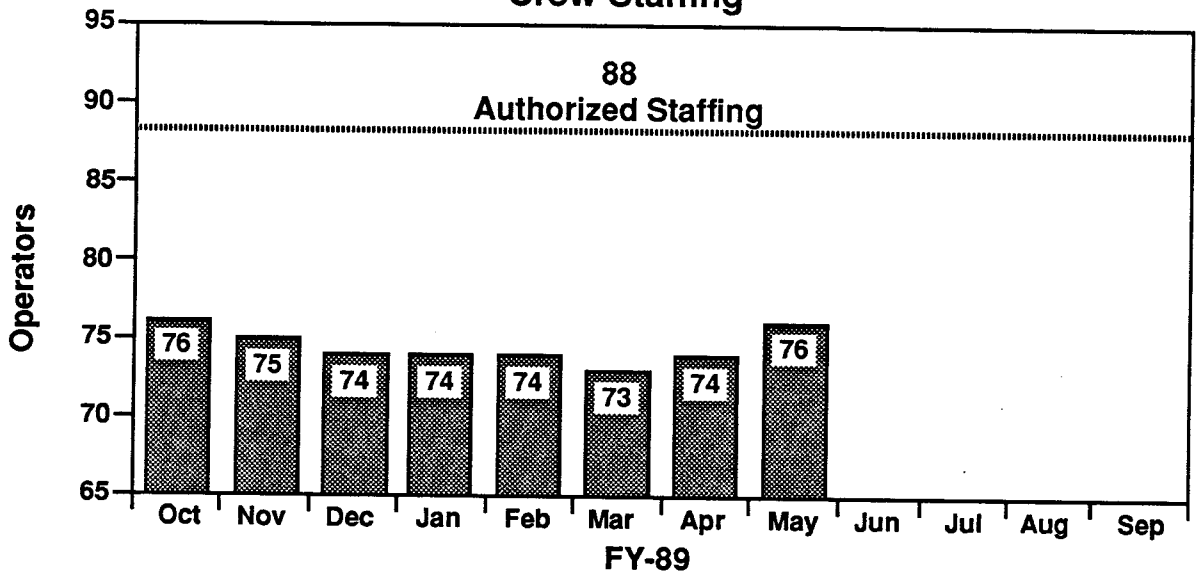
TABLE 2

OTHER PERFORMANCE INDICATORS

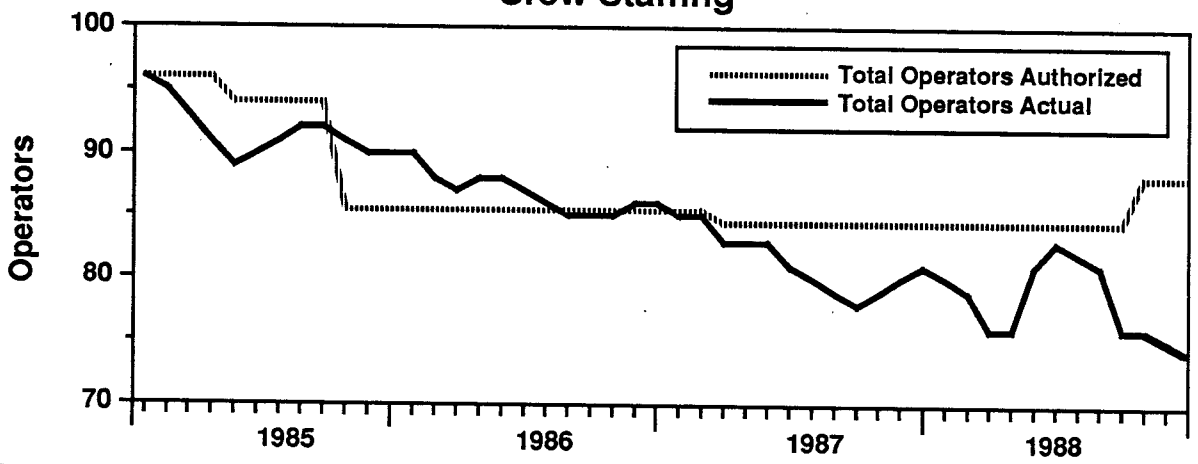
| FIGURE | PERFORMANCE INDICATOR | AREA |
|---|---|---|
| 8 | Total Operations Staffing | OPS |
| 9 | Qualified Plant Operators | OPS |
| 10 | Qualified Control Room Operators | OPS |
| 11 | Reportable Events | OPS |
| 12 | Outage Planning Performance | MAINT |
| 13 | Corrective Maintenance Backlog | MAINT |
| 14 | Protective Maintenance Performance | MAINT |
| 15 | Modification Status | ENG |
| 16 | Temporary Modification Status | ENG |
| 17 | Essential Drawing Status | ENG |
| 18 | Tagouts | OPS |
| 19 | Staffing Status | PERS |
| 20 | Qualified Operator Overtime | OPS |
| 21 | Solid Radioactive Waste | RADCON |
| 22 | Liquid Radioactive Waste | RADCON |
| 23 | Skin Contaminations | RADCON |
| 24 | Safety/Quality Commitments | QA |
| 25 | FFTF Operating Histogram | OPS |
| 26 | Annual Operational Performance | OPS |

# Total Operations Staffing

## Crew Staffing




## Crew Staffing




## Purpose

To monitor the operating crew staffing by tracking the total number of people assigned to operating crews. This is an indicator of the ability of Operations to support current and future plant activities. Some of the assigned operators may be in training or awaiting clearances prior to being assigned operating duties.

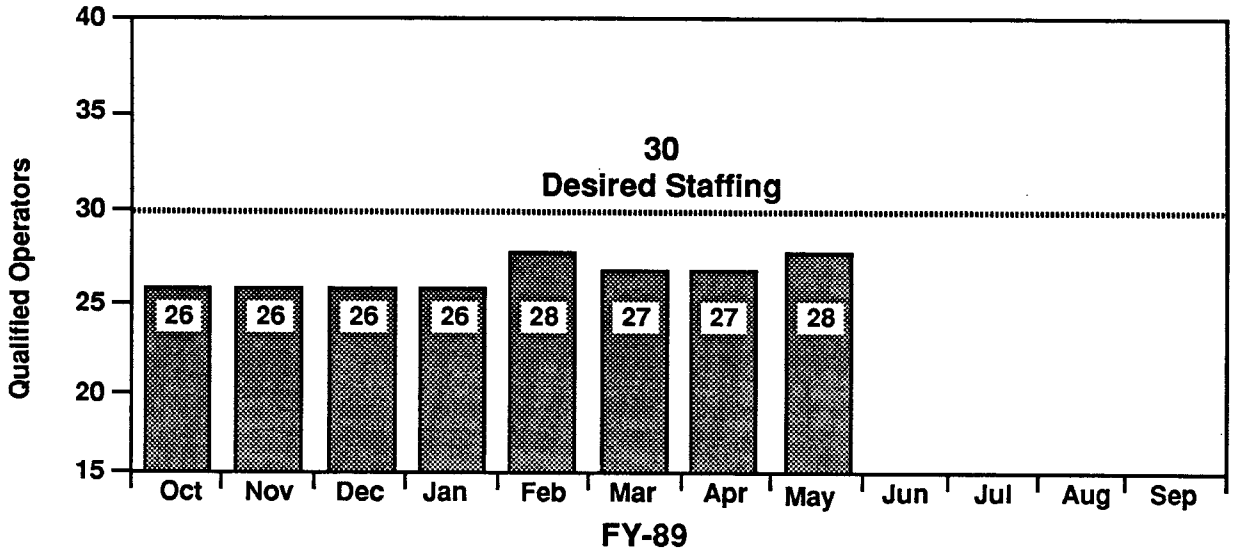
## Assessment

There was a slight increase in staffing as a result of the action plan efforts.

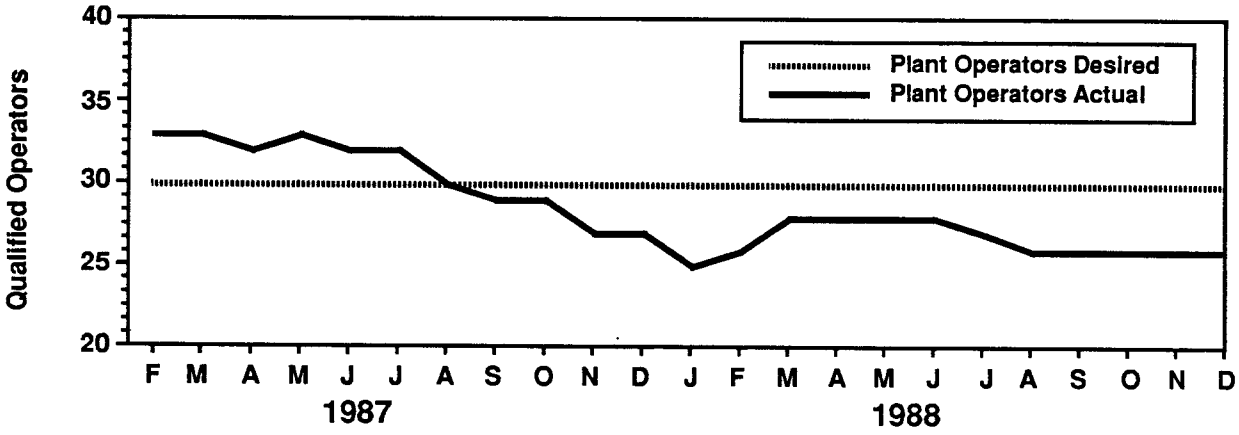
| | | | |
|---|---|---|---|
| May 1989 | D. J. Swaim | 376-0604 | Figure 8 |

# Qualified Plant Operators

## Crew Plant Staffing




## Crew Plant Staffing




## Purpose

To monitor the number of key personnel who are qualified outside the control room. This is an indicator of the number of field operators available to support plant activities and operate the plant safely and efficiently.

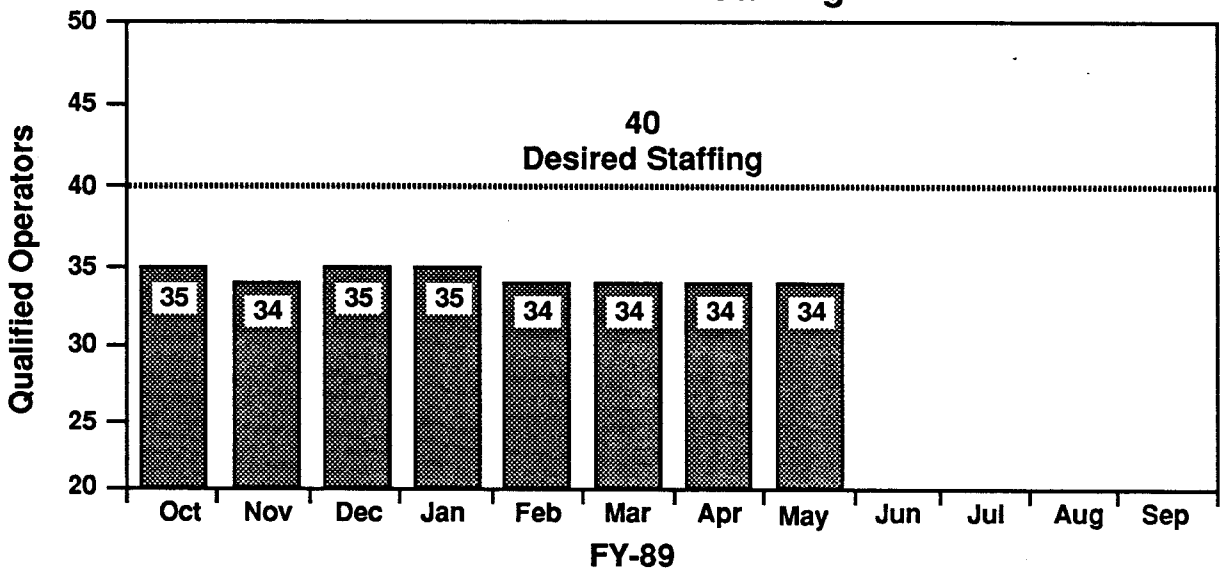
## Assessment

The number of qualified plant operators for the month of May was 28. Extensive use of overtime and support shift personnel was required to support outage activities.

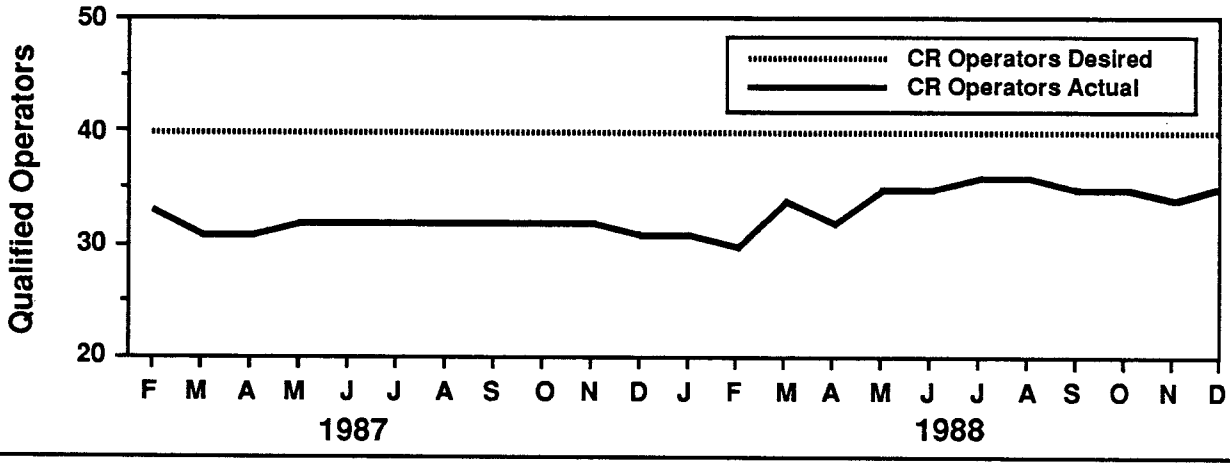
| | | | |
|---|---|---|---|
| May 1989 | D. J. Swaim | 376-0604 | Figure 9 |

# Qualified Control Room Operators

## Crew Control Room Staffing




## Crew Control Room Staffing




## Purpose

To monitor the number of key non-supervisory personnel qualified to stand watch in the control room. It is an indication of the knowledge and experience level of Operations personnel and reflects the ability of the organization to safely and efficiently operate the plant.

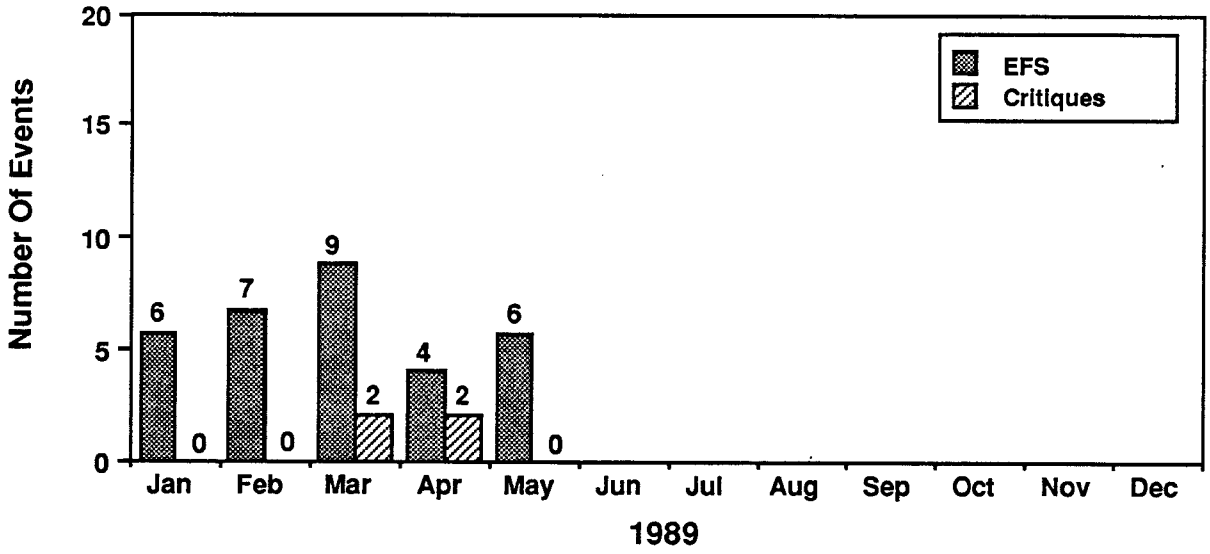
## Assessment

The total number of qualified control room operators for the month of May was 34. While the safety of operations is not affected, use of overtime is required to support non-routine evolutions.

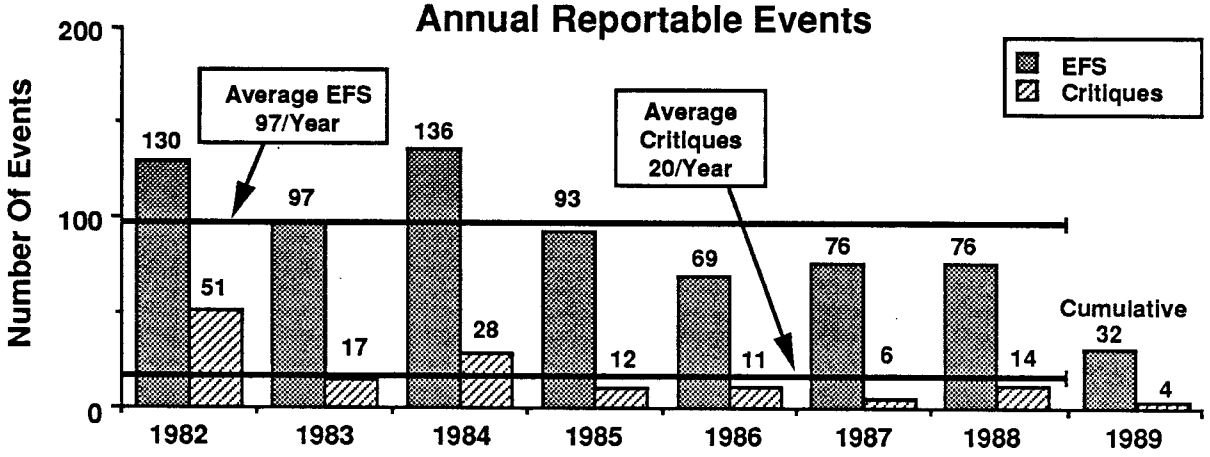
| | | | |
|---|---|---|---|
| May 1989 | D. J. Swaim | 376-0604 | Figure 10 |

# Reportable Events

## Monthly Reportable Events




## Annual Reportable Events




## Purpose

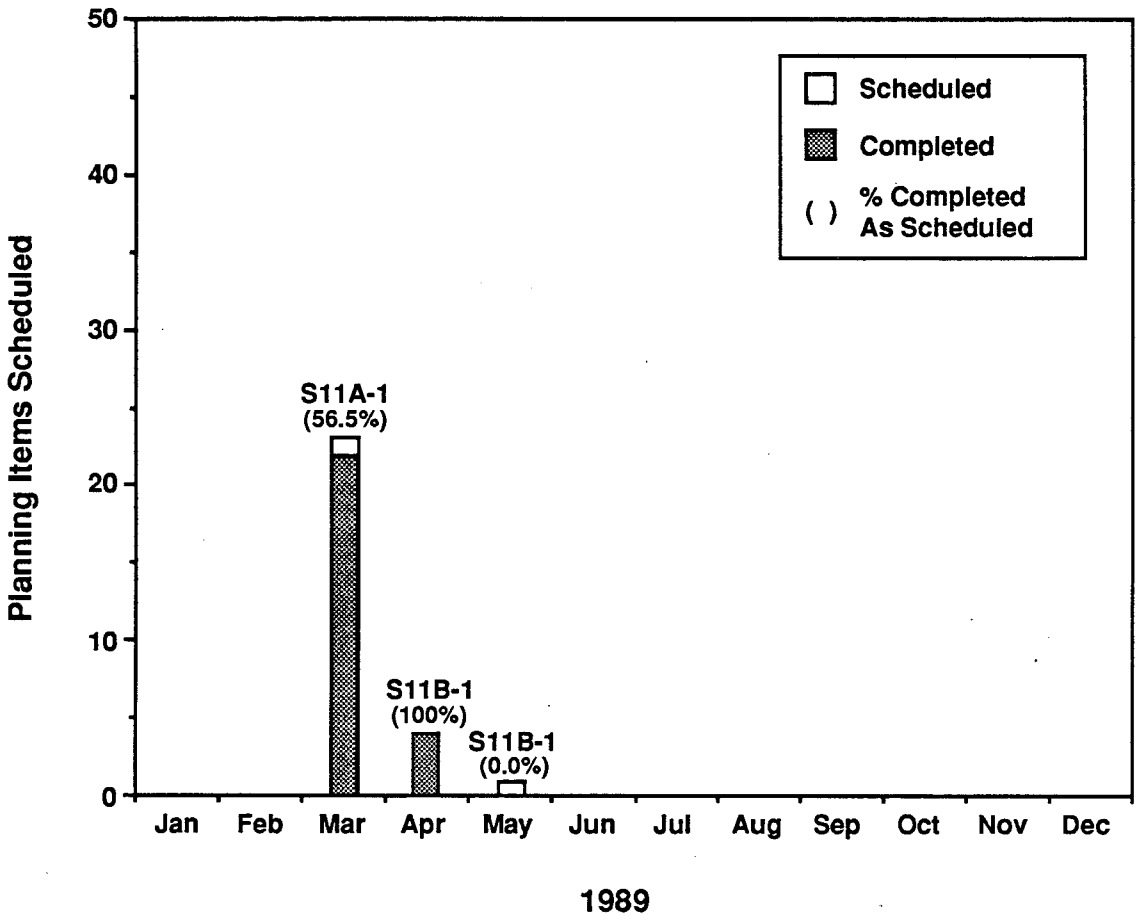
To monitor the number of Event Fact Sheets (EFS) and Critiques. An Event Fact Sheet records any significant unplanned event that may or may not be reportable as a Critique or Unusual Occurrence Report (UOR). A Critique is an evaluation of those events that do not meet the criteria for a UOR, but require investigation beyond that identified in an EFS.

## Assessment

There were six Event Fact Sheets and no Critiques written this month.

| | | | |
|---|---|---|---|
| May 1988 | D. J. Swaim | 376-0604 | Figure 11 |

# Outage Planning Performance




## Purpose

To monitor overall planning progress in preparing for major refueling outages. Planning action items are scheduled for completion based on a set number of calendar days prior to the start of an outage. The number of scheduled and completed action items are plotted in bar graph format. The percentage of items completed within one week of the scheduled date is indicated above the bar.

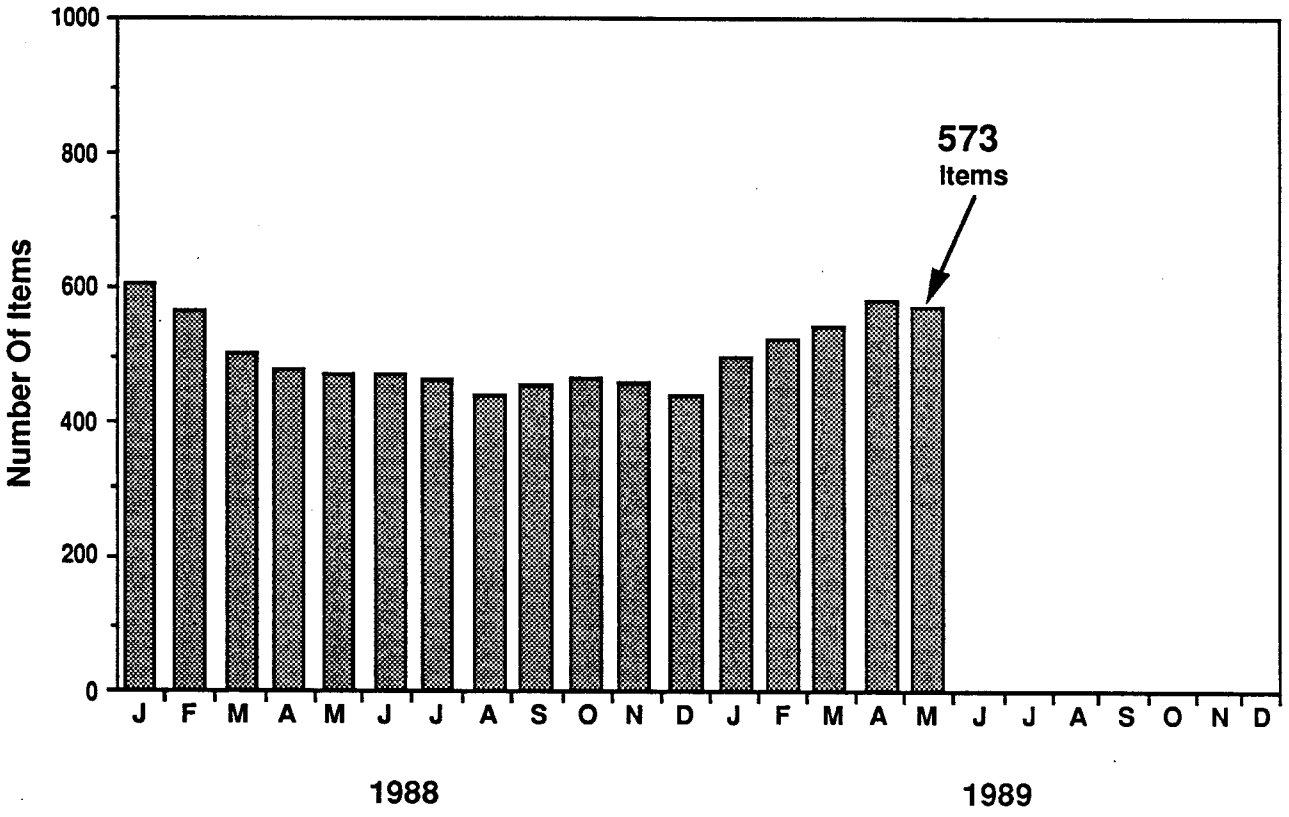
## Assessment

Planning for the S11A-1 Outage is complete. Planning is only beginning for the S11B-1 Outage, hence not many items (only one) were due in May. This item was the development of the S11B-1 critical path. Efforts focused on scheduling for S11A-3 and S11A-4 have diverted attention from this item. It will be issued in early June.

| | | | |
|---|---|---|---|
| May 1989 | R. D. Redekopp | 376-9668 | Figure 12 |

# Corrective Maintenance Backlog

## Total Corrective Maintenance Backlog




## Purpose

To monitor the overall material condition of the FFTF. Corrective maintenance is defined as activity that repairs, restores, or modifies plant equipment to restore it to the intended design condition or function.

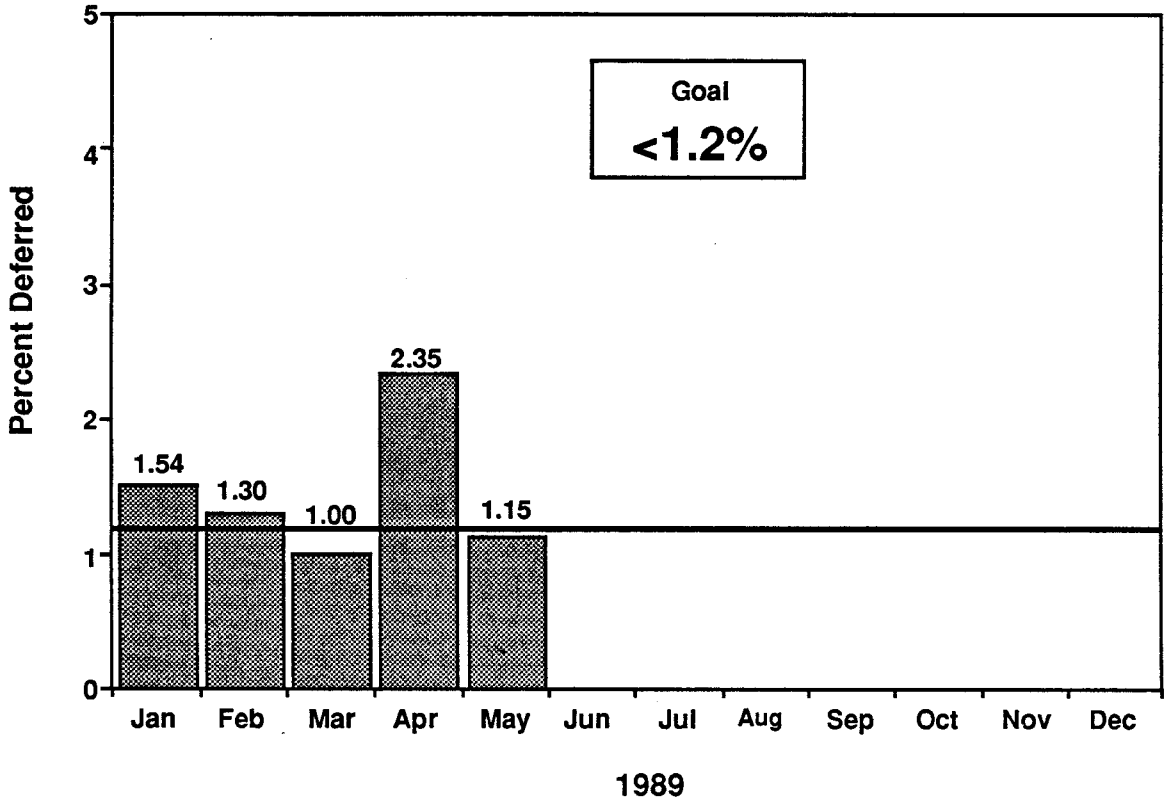
## Assessment

The total corrective maintenance backlog decreased to 573 items during the month of May. This decrease helped increase the percentage greater than three months old. This decrease should also be considered a temporary phenomenon and not an indication of gaining control of this number.

| | | | |
|---|---|---|---|
| May 1989 | R. D. Redekopp | 376-9668 | Figure 13 |

# Protective Maintenance Performance

## Protective Maintenance Items Deferred




## Purpose

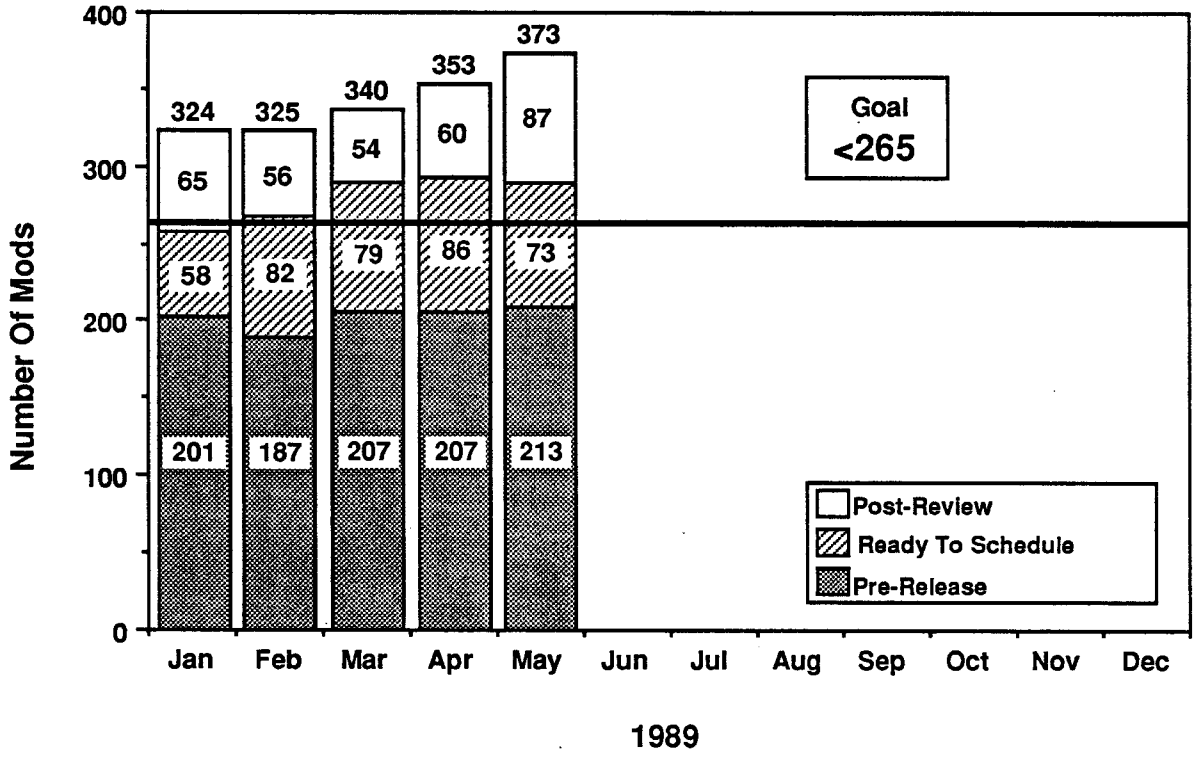
To monitor the number of protective maintenance (PMP and ICR) items that have been deferred. It illustrates the organization's ability to schedule and complete routine maintenance.

## Assessment

The protective maintenance backlog has recovered to less than 1.2% and is currently at 1.15%. The packages requiring dispostition have risen, threatening maintenance of the backlog at this level. Continued focus on disposition of problems in the field will be required to maintain the backlog at this low value.

| | | | |
|---|---|---|---|
| May 1989 | R. D. Redekopp | 376-9668 | Figure 14 |

# Modification Status




## Purpose

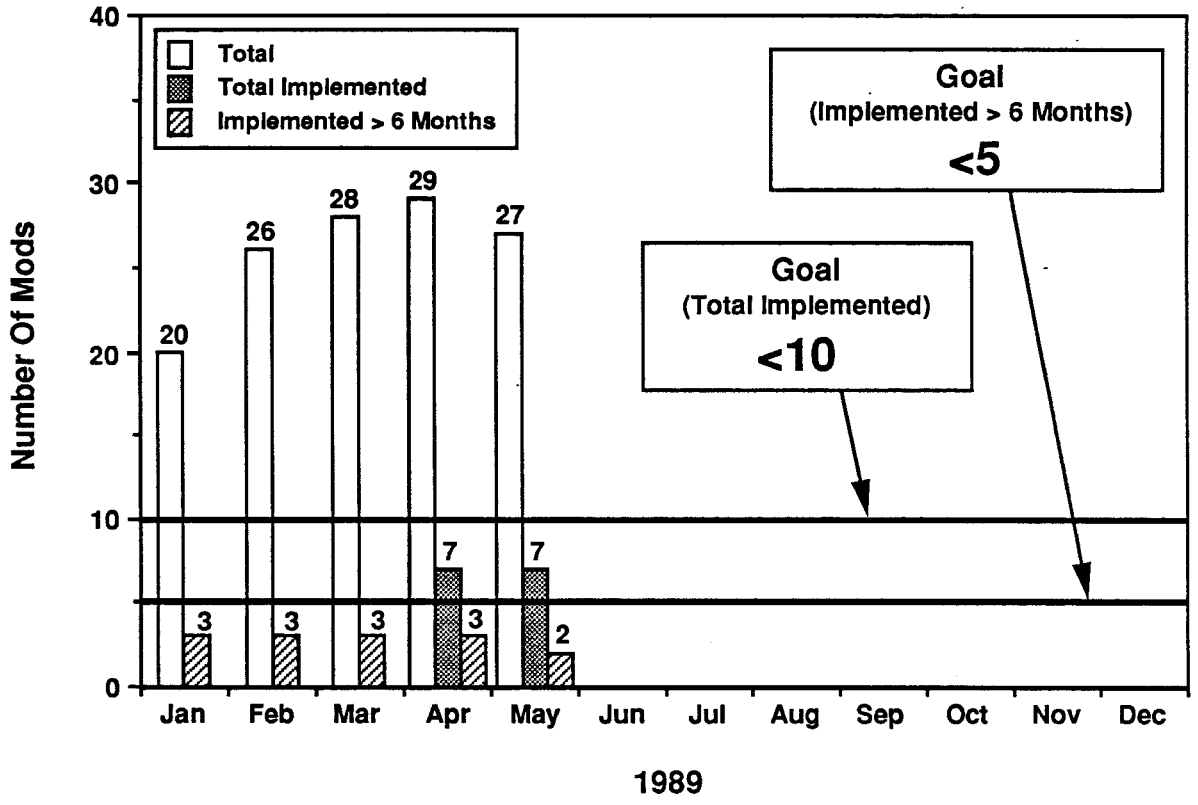
To monitor the number of plant modifications that are active in the Plant Tracking System (PTS). It illustrates the organization's ability to design, implement and closeout changes in the plant.

## Assessment

The total number of outstanding modifications increased again during May. This particular parameter does not currently have the priority required to reduce the total number of modifications. However, efforts to close out modifications that have been performed will greatly help achieve this goal.

| | | | |
|---|---|---|---|
| May 1989 | R. D. Redekopp | 376-9668 | Figure 15 |

# Temporary Modification Status




## Purpose

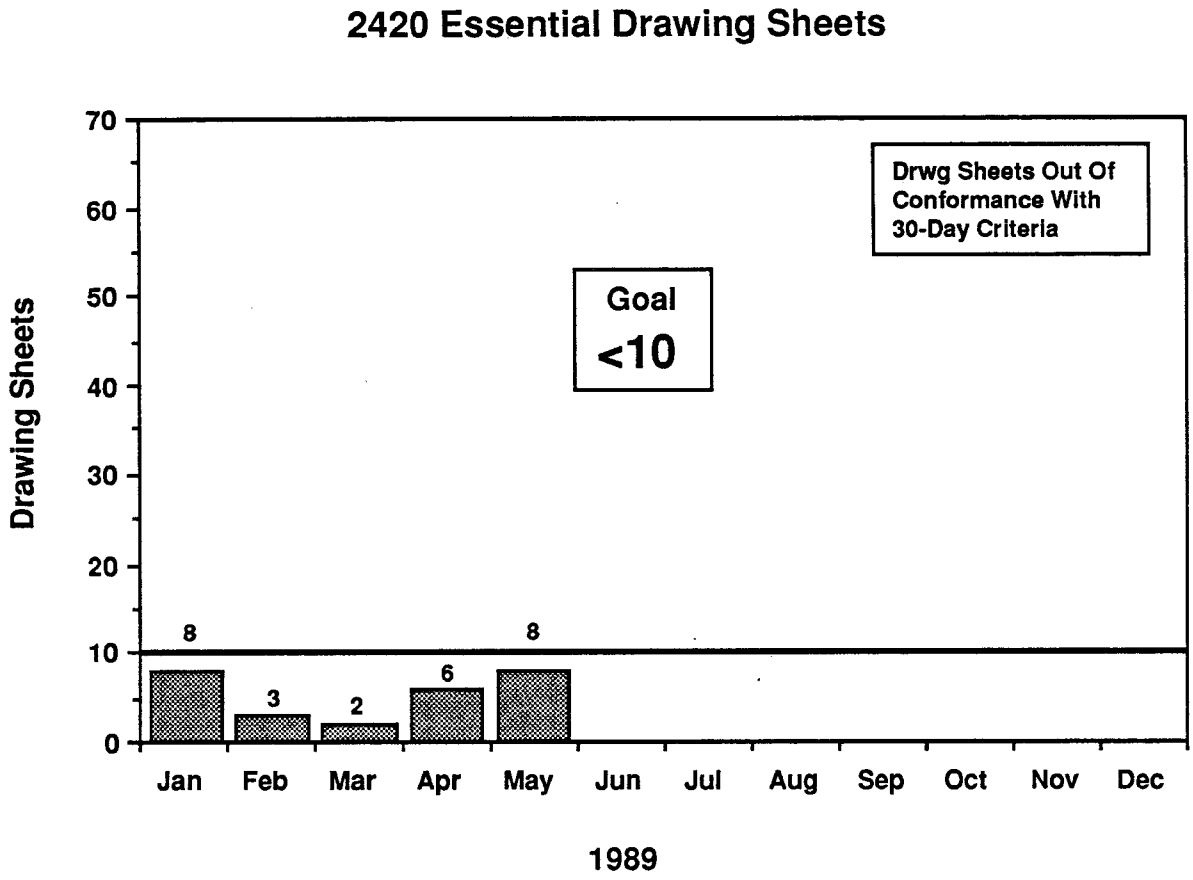
To monitor the number of modifications that are not permanent. It also monitors the organization's ability to complete the documentation and provide permanent changes to the FFTF.

## Assessment

The total number of temporary modifications (MOD[L]s) that have PTS numbers (planned, future MOD[L]s) has dropped slightly this month. The number implemented for greater than six months has also dropped. This parameter has been performing well and perhaps is due for a new goal.

| | | | |
|---|---|---|---|
| May 1989 | R. D. Redekopp | 376-9668 | Figure 16 |

# Essential Drawing Status




## Purpose

To monitor the number of essential drawing sheets on which changes have not been incorporated within thirty working days after completion of the field work package.

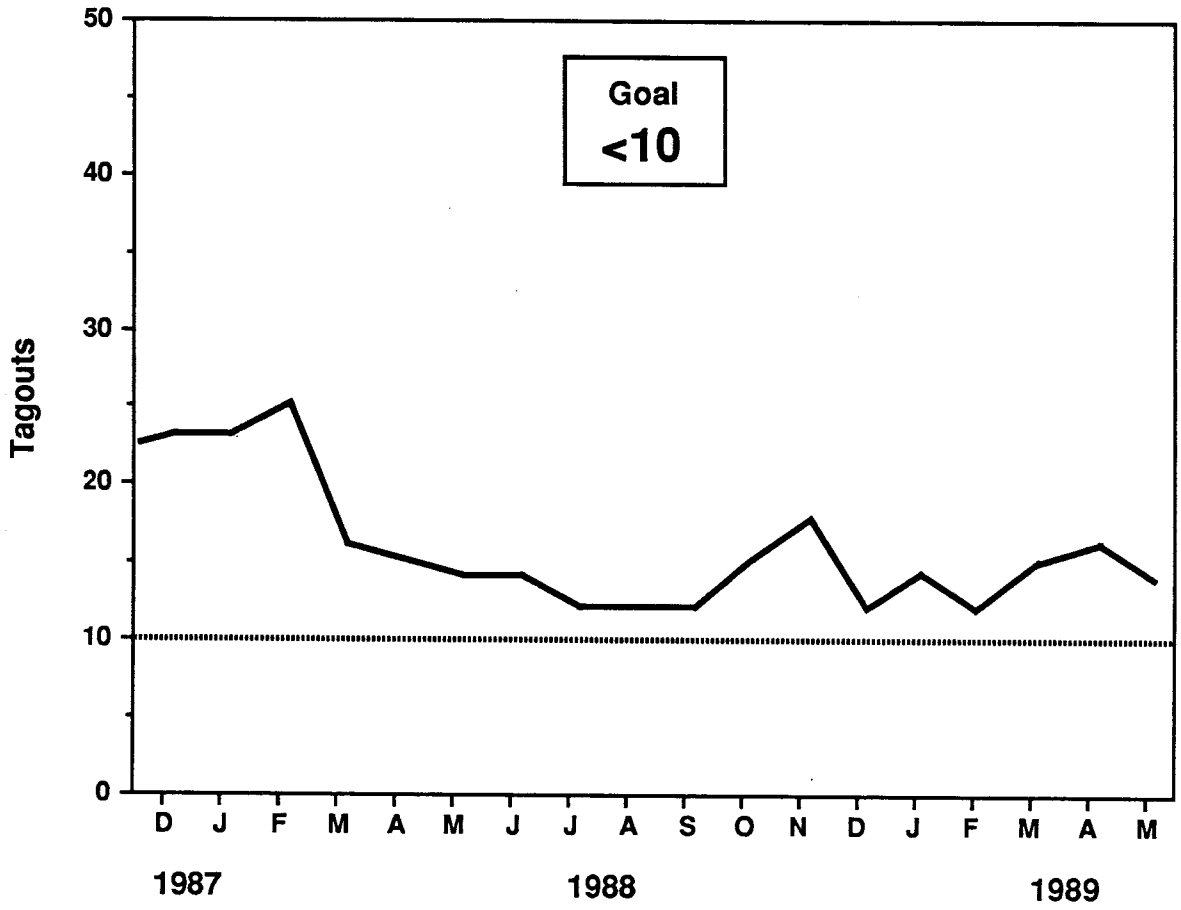
## Assessment

It appears that a working level of five sheets is still a normal backlog and a target to maintain the month to month level less than ten sheets is still reasonable.

| | | | |
|---|---|---|---|
| May 1989 | J. B. Waldo | 376-0400 | Figure 17 |

# Tagouts

## Tagouts Greater Than Six Months Old




## Purpose

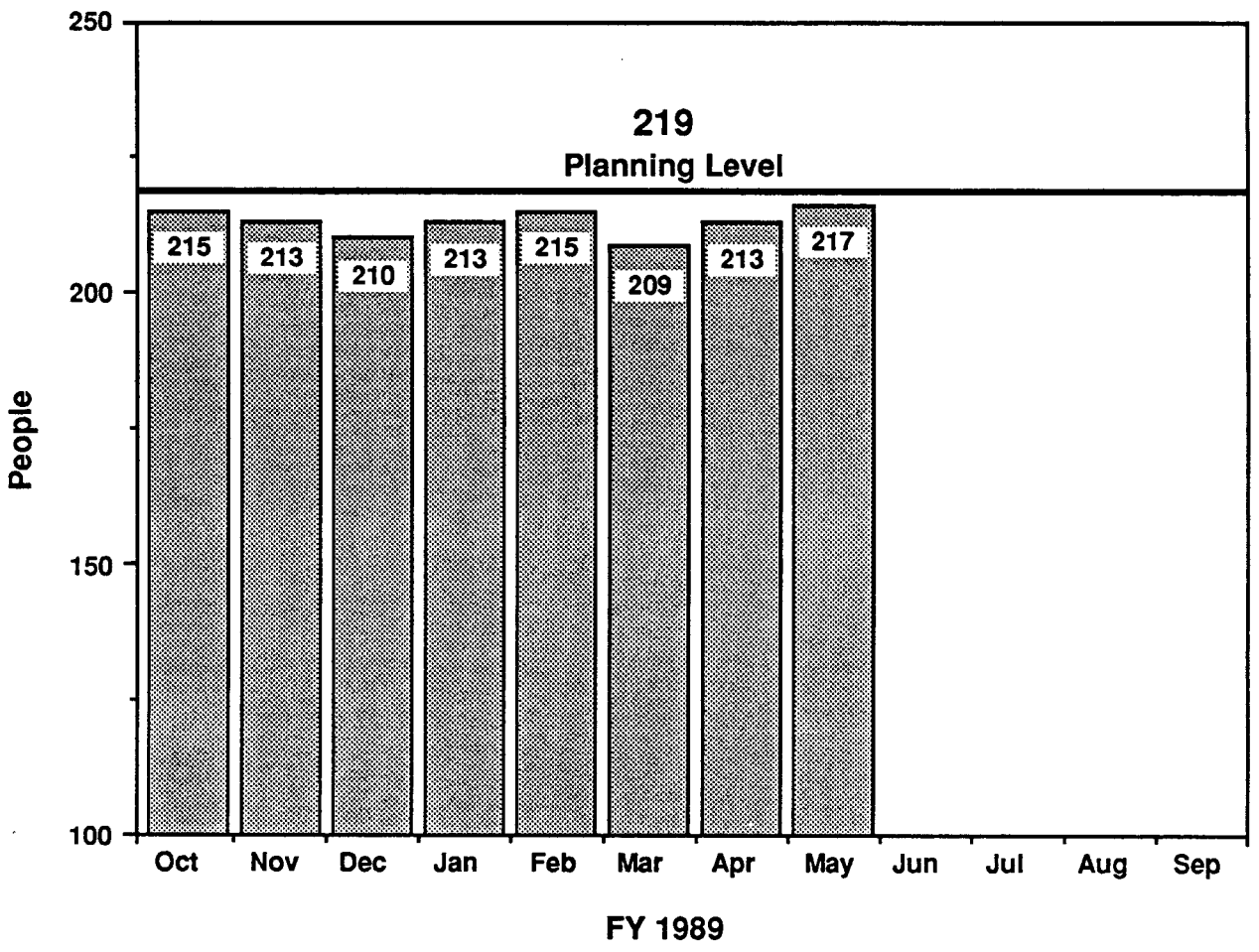
To monitor tagouts which have been in place for six months or longer. This is an indicator of the plant equipment which has been unavailable or in reduced status for at least six months.

## Assessment

The number of tagouts in place for six months or longer during May was 14. Action on work requests which have associated tagouts greater than six months old has been requested by appropriate management.

| | | | |
|---|---|---|---|
| May 1989 | D. J. Swaim | 376-0604 | Figure 18 |

# Direct Staffing




## Purpose

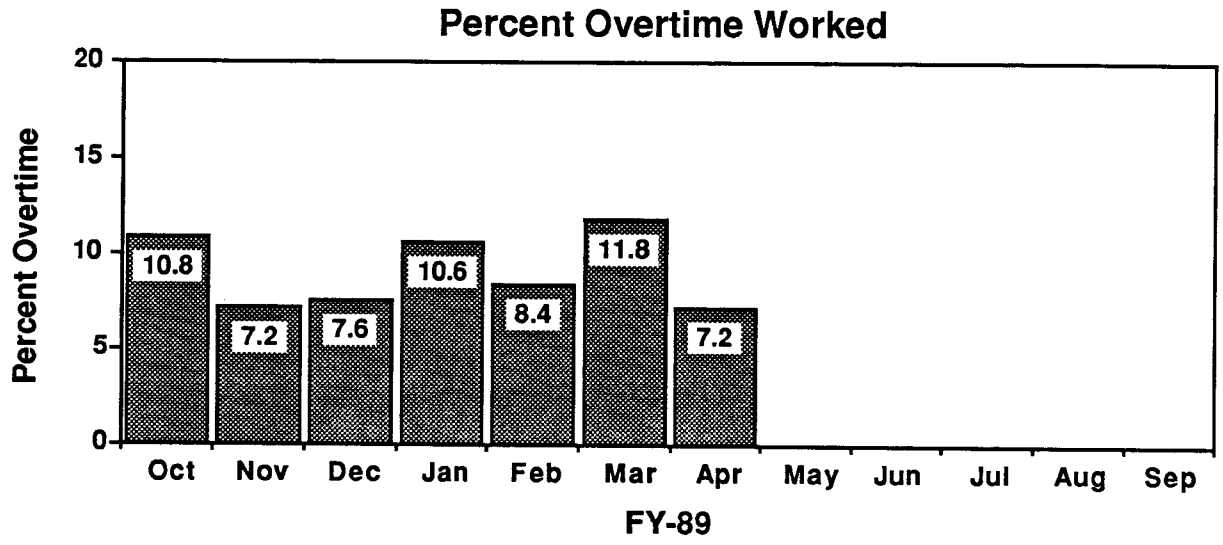
To monitor the number of direct staff. The number of direct staff is obtained from monthly manpower reports.

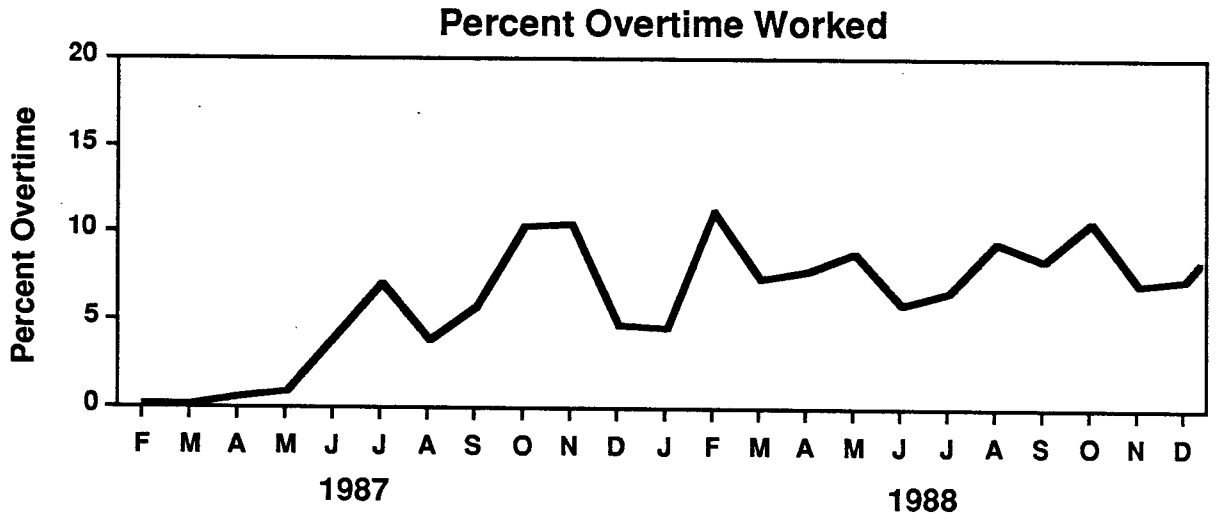
## Assessment

The number of FFTF direct staff remained essentially the same through May, slightly below the planning level.

| | | | |
|---|---|---|---|
| May 1989 | J. E. Truax | 376-0758 | Figure 19 |

# Qualified Operator Overtime




## Purpose

To monitor overtime usage of the operating crews. This is an indicator of the ability of Operations to support scheduled activities with on-crew staff.

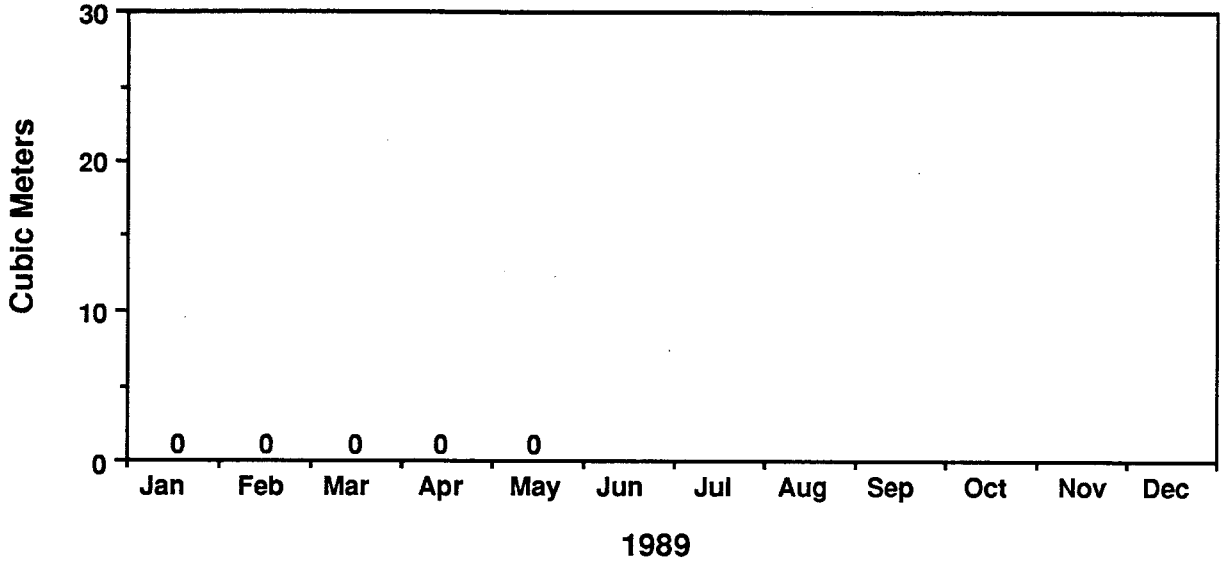
## Assessment

The overtime usage is higher than desired. The outage in April required additional resources to support scheduled activities. Efforts to limit the amount of overtime include assignment of support shift personnel to outage activities and increasing staffing to the authorized level.

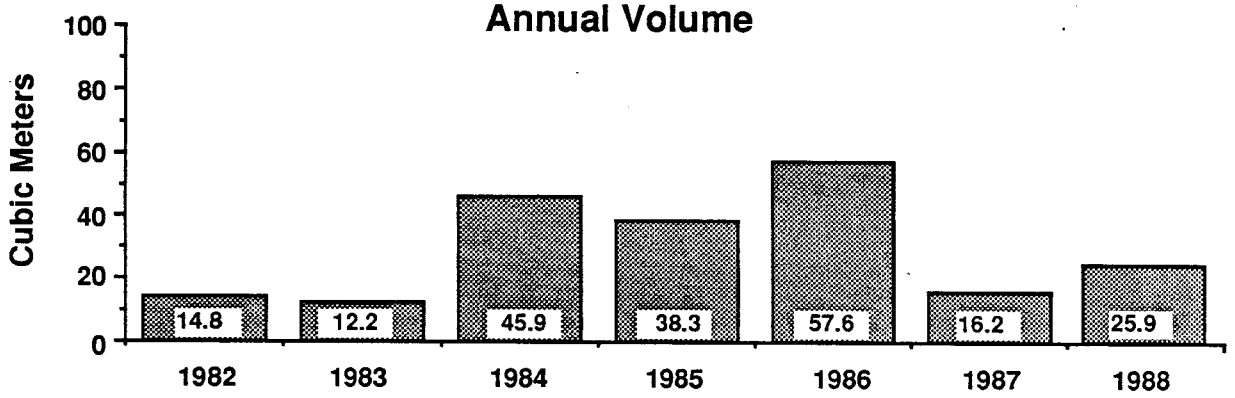
| | | | |
|---|---|---|---|
| May 1989 | D.J. Swaim | 376-0604 | Figure 20 |

# Solid Radioactive Waste

## Monthly Volume




## Annual Volume




## Purpose

To monitor the volume of solid radioactive waste that is shipped off the FFTF site. Solid radioactive waste generated from the FFTF, IEM cell, and MASF are included in the totals.

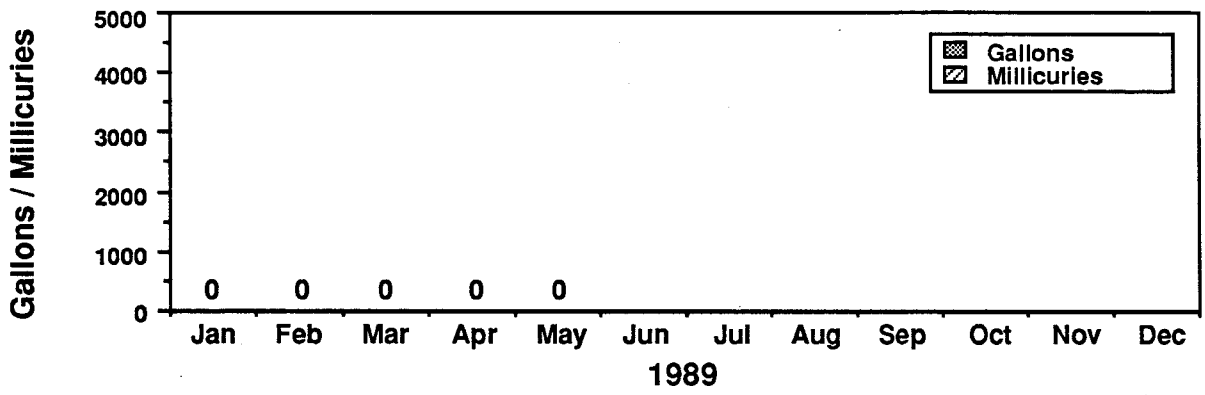
## Assessment

There were no shipments of solid radioactive waste during the month of May.

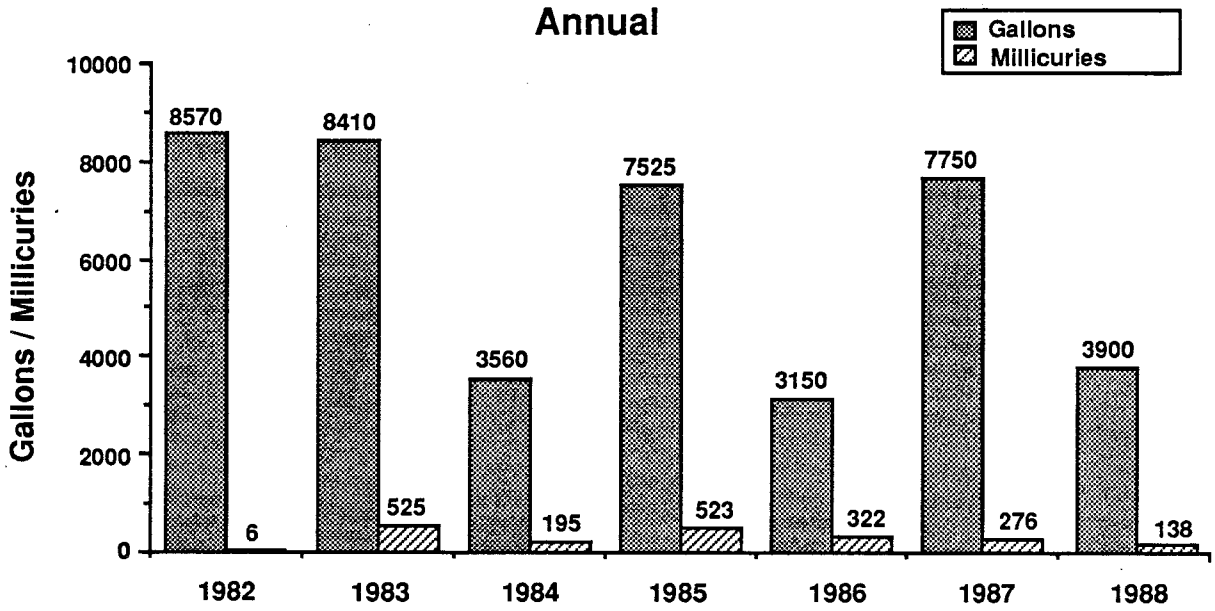
| | | | |
|---|---|---|---|
| May 1989 | D. J. Swaim | 376-0604 | Figure 21 |

# Liquid Radioactive Waste

## Monthly




## Annual




## Purpose

To monitor the volume of liquid radioactive waste shipped from storage tank T-103 to the railroad tank car for shipment off the FFTF site.

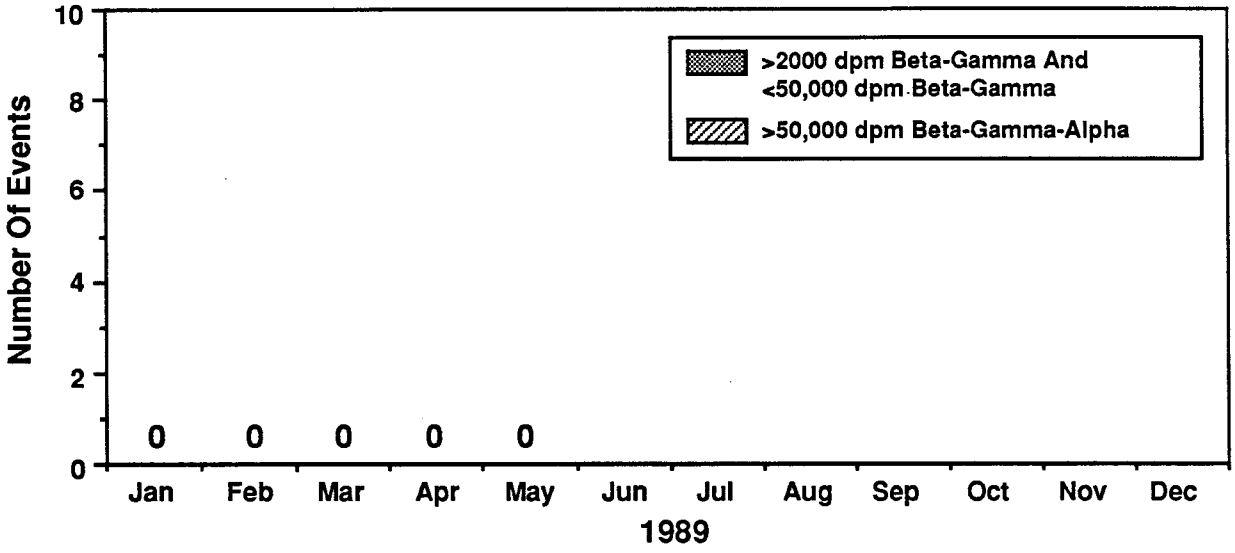
## Assessment

There were no shipments of liquid radioactive waste during the month of May.

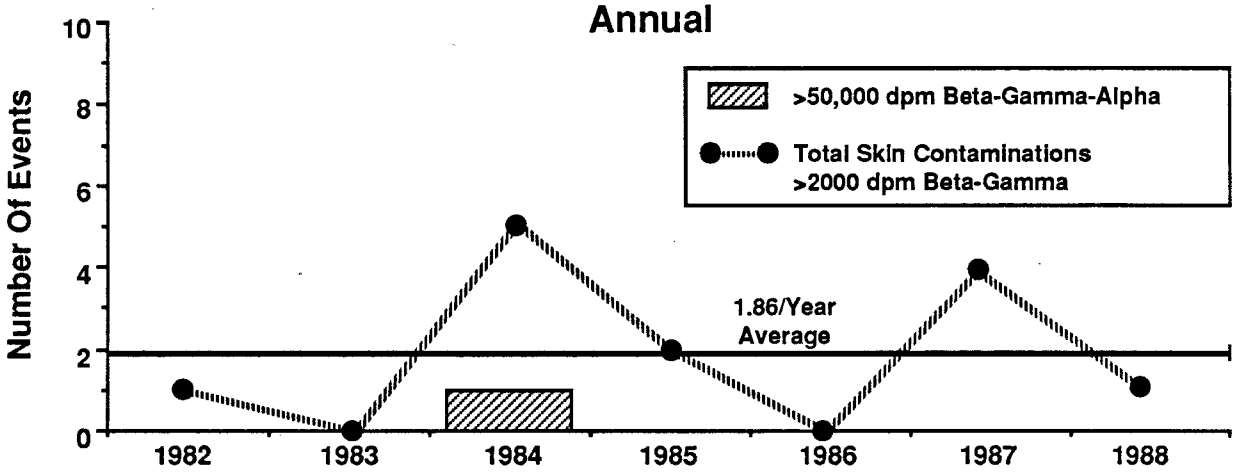
| | | | |
|---|---|---|---|
| May 1989 | D. J. Swaim | 376-0604 | Figure 22 |

# Skin Contaminations

## Monthly




## Annual




## Purpose

To monitor the number of recordable and significant (reportable) skin contamination events. A recordable skin contamination event is any event with detectable contamination levels above 2000 dpm/probe area beta-gamma and/or 500 dpm/probe area alpha (not to include radon/thoron isotopes). A significant (reportable) skin contamination event is any event with detectable contamination levels above 50,000 dpm/probe area beta-gamma-alpha.

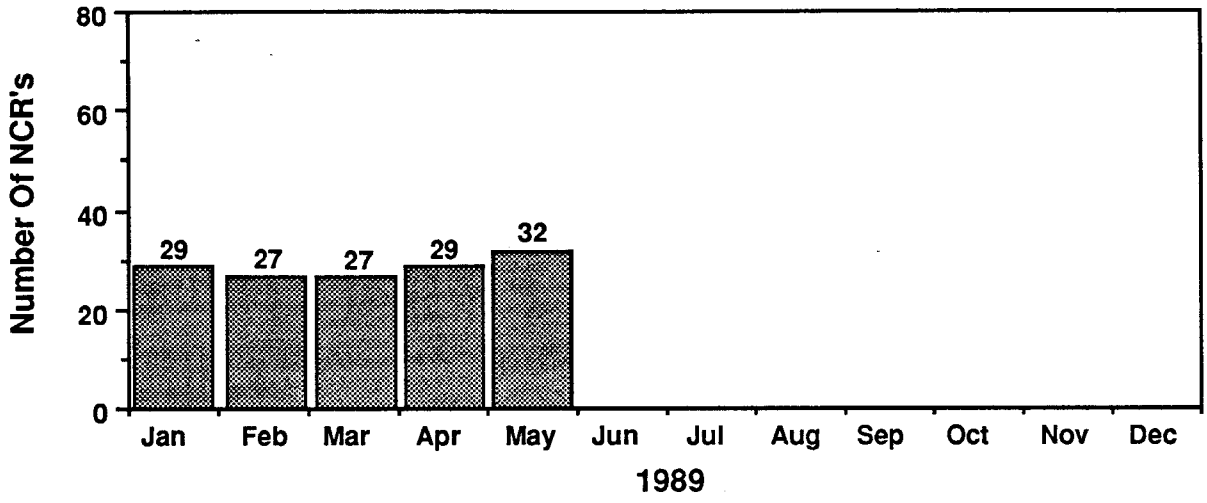
## Assessment

There were no skin contamination events in the 400 area during the month of May.

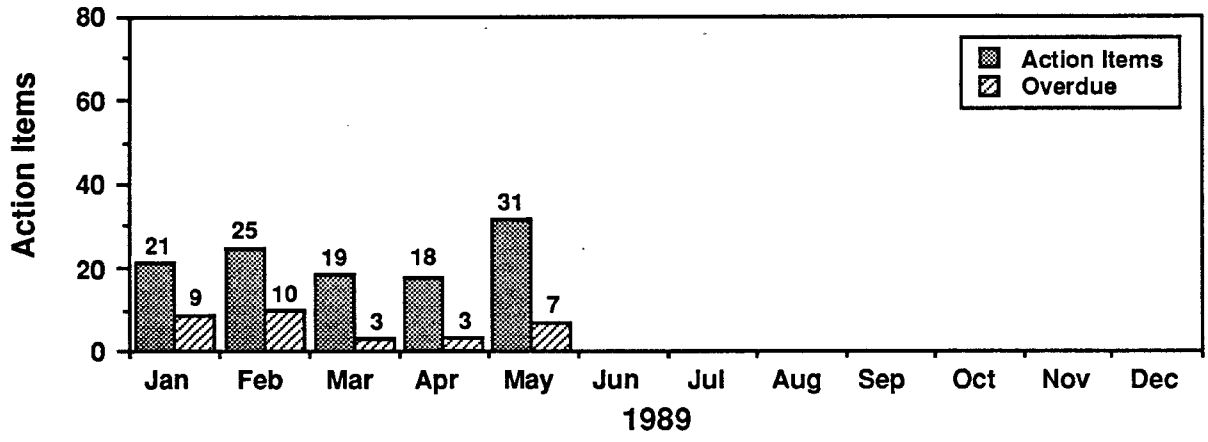
| | | | |
|---|---|---|---|
| May 1989 | R. L. Watts | 376-3111 | Figure 23 |

# Safety/Quality Commitments

## Nonconformance Reports




## Action Items




## Purpose

To monitor the number of NonConformance Reports (NCR) and action items resulting from reportable events, critiques, and UOR's. The number of overdue action items is also monitored to measure responsiveness to completing identified action items.

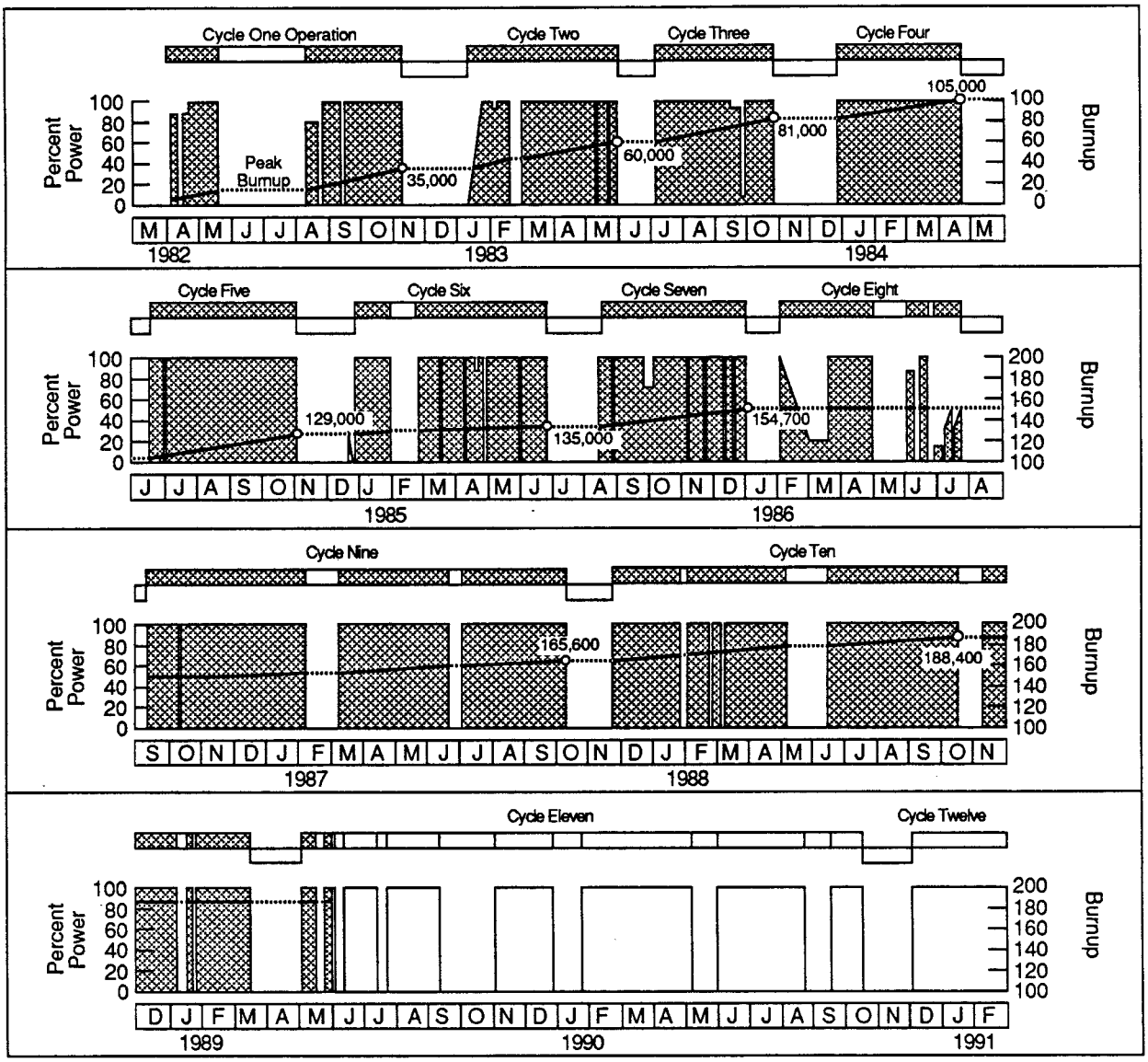
## Assessment

The slight increase in NCR's is due to activities in the S11A-2 Outage and during preparations for a Quality Assurance audit conducted this month. Activities are in place to resolve these NCR's and to reduce the total.

The number of overdue activities has increased to seven. Five of the seven became overdue during May while the remaining two items were previously overdue. Actions continue to be taken to close out these items and remove them from the overdue list.

| | | | |
|---|---|---|---|
| May 1989 | R. K. Hulvey | 376-1805 | Figure 24 |

# FFTF Operating Histogram



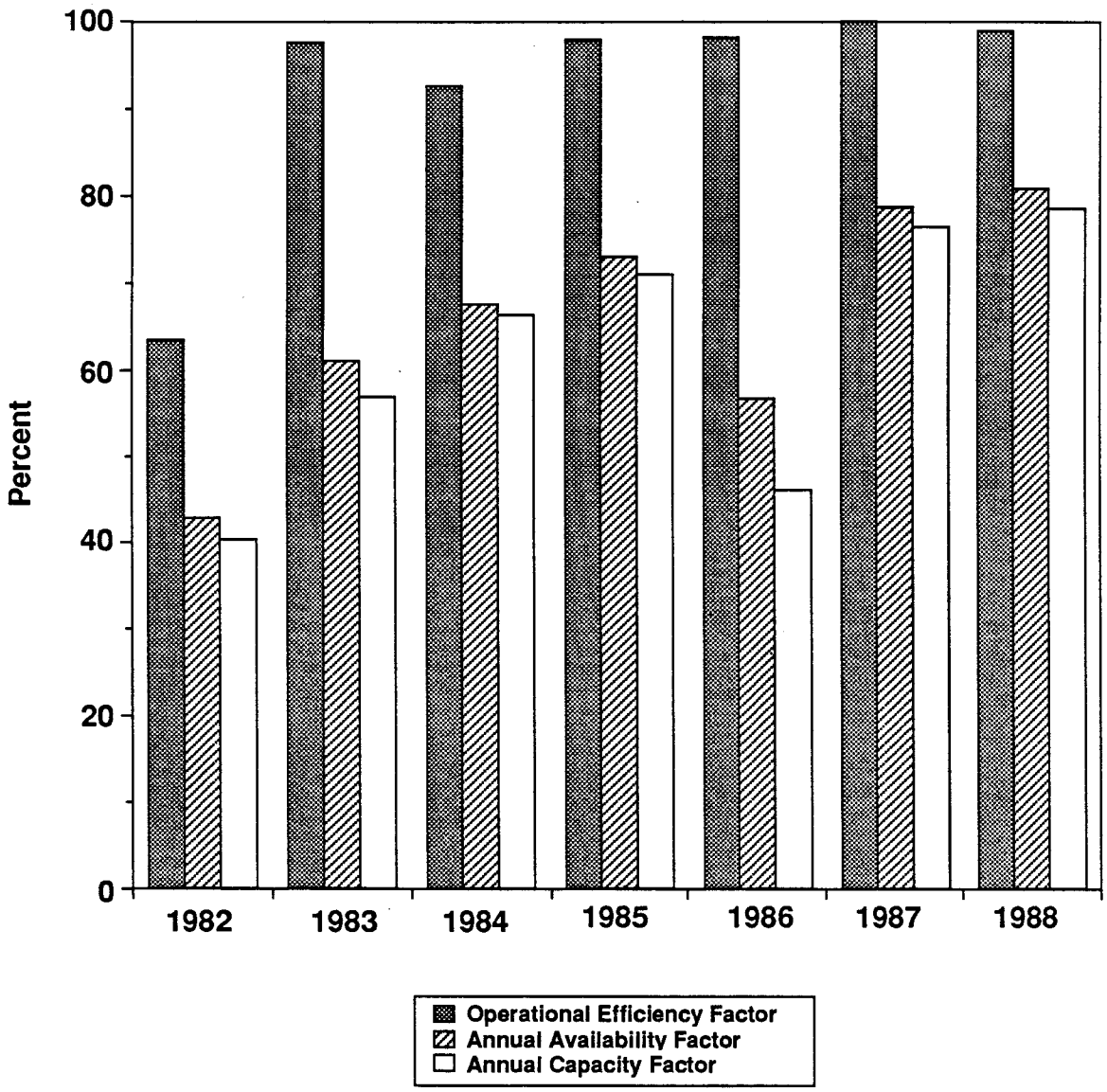

# Operating Statistics

| | Cycle 1 | Cycle 2 | Cycle 3 | Cycle 4 | Cycle 5 | Cycle 6 | Cycle 7 | Cycle 8 | Cycle 9 | Cycle 10 | Cycle 11 (5/31/89) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EFPD For Cycle: | 101.5 | 100.5 | 101.5 | 109.5 | 122.7 | 134.0 | 122.8 | 63.0 | 341.8 | 385.3 | 20.6 |
| Total Plant EFPD At End Of Cycle: | 134.3 | 234.8 | 336.3 | 445.8 | 568.5 | 702.5 | 825.3 | 888.3 | 1230.1 | 1615.4 | 1636.1 |
| Cycle Capacity Factor (%): | 50.3 | 83.1 | 93.5 | 99.5 | 93.5 | 74.9 | 90.3 | 38.9 | 86.6 | 80.1 | 71.2 |
| Availability Factor (%): | 53.0 | 90.6 | 99.0 | 100.0 | 94.6 | 78.5 | 94.6 | 57.9 | 89.6 | 83.4 | 80.7 |
| Number Of Experiments:* | 62 | 64 | 52 | 51 | 52 | 41 | 31 | 35 | 46 | 50 | 33 |
| Maximum Fuel Burnup At End Of Cycle (Mwd/MT): | 35,000 | 60,000 | 81,000 | 105,000 | 129,000 | 135,000 | 154,700 | 154,700 | 165,600 | 188,400 | 188,400 |

*The Total Number Of Experiments Irradiated During Any Given Cycle Includes DE (Tracked Through EOL), LPMA And GEM.

| May 1989 | J. E. Truax | 376-0758 | Figure 25 |
|---|---|---|---|

# Annual Operational Performance




| | 1982* | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|---|---|---|
| Capacity Factor (%): | 40.5 | 56.9 | 66.4 | 71.0 | 46.2 | 76.5 | 78.5 |
| Availability Factor (%): | 42.8 | 61.1 | 67.6 | 73.0 | 56.8 | 78.7 | 81.2 |
| Operational Efficiency Factor (%): | 63.5 | 97.6 | 92.6 | 98.0 | 98.1 | 100.0 | 98.9 |

* Reporting Began At Start Of Cycle 1 On April 16, 1982

| May 1989 | J. E. Truax | 376-0758 | Figure 26 |
|---|---|---|---|

# DISTRIBUTION

## FFTF PERFORMANCE MONITORING MANAGEMENT INFORMATION

| | | | |
|---|---|---|---|
| W. H. Arnold | H5-59 | G. R. Lockard | N2-03 |
| D. E. Bailey | DOE-HQ | W. C. McClung | A4-35 |
| Q. L. Baird | N1-72 | P. C. Miller | N2-04 |
| J. R. Bell | R3-60 | J. Montano | N2-51 |
| R. A. Bennett | N2-32 | R. J. Neuhold | DOE-HQ |
| S. I. Bennion | N1-71 | D. J. Newland | N2-51 |
| P. B. Bourne | B3-04 | R. C. Nichols | B3-02 |
| H. N. Bowers | L6-57 | J. E. Nolan | B3-01 |
| N. C. Boyter | B4-52 | R. E. Peterson | R2-30 |
| G. D. Carpenter | R2-85 | R. D. Redekopp | N2-33 |
| N. R. Dahl | N2-04 | L. H. Rice | L5-57 |
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| E. W. Gerber | L5-58 | D. E. Simpson | B3-51 |
| E. F. Gray | N2-35 | R. G. Slocum | R2-34 |
| R. A. Hunter | DOE-HQ | R. N. Smith | N2-50 |
| K. R. Jordan | L0-11 | D. J. Swaim (2) | N2-34 |
| M. S. Karol | A6-55 | J. E. Truax | N2-51 |
| R. H. Koga/T.C. Varljen | B3-07 | J. B. Waldo (2) | N2-57 |
| M. K. Korenko | L5-56 | R. L. Watts | L6-52 |
| | | Corres. Processing (4) | L8-15 |

June 1989