

ENHANCED WORK PLANNING PERFORMANCE INDICATOR TOOL

Executive Summary: This Enhanced Work Planning (EWP) performance indicator (PI) tool measures the percent of maintenance jobs that were suspended during the course of work. This is an activity-level PI tool for maintenance work control process performance. The control variable is the number of work packages that, during the course of being worked, had to be suspended divided by the total number completed. These suspensions represent work stoppages that can adversely affect completion rates, backlog reduction, and time to restore equipment to service. The number of suspensions is also analyzed using Pareto charts to document leading reasons why jobs were suspended. The analysis of suspension causes leads management to identify probable areas where corrective action(s) can be taken.

Performance Indicator Name: Percent of Maintenance Work Completed without Suspension

Purpose: Improve the flow of maintenance work in the field by minimizing the need to suspend work. Suspension is defined as having to stop the planned execution of work for any reason. Work stoppages for lack of materials, change of scope, work package revisions or changes, paperwork errors, changes of scheduling and more impact schedule, drive up costs and waste workers' time. The overall maintenance effort becomes more efficient if work can be worked to completion as planned. This performance indicator tool is used to identify possible areas for improvement in the work control process.

Background: All Department of Energy sites are required to have processes to control work. Significant work is required to be "released or authorized to work" by operations management. When the operating conditions and criteria necessary for the work to be performed are no longer met, such as material availability, qualified workers, etc., this "release" may need to be rescinded. Common problems that emerge include material availability, non-availability of qualified workers, or inability to shut down equipment. When one of these problems occurs, the operations manager must suspend the work. Most computerized maintenance management systems (CMMS) have a methodology to document when work was released, and when any rescinding of that release occurred and why.

Example: A facility uses a computer maintenance management tracking system called the Job Control System (JCS) to track work packages. This software is locally developed, but similar to most commercial products such as Passport. Status codes are utilized to designate the progress of the work package. Common codes are "in design", "in planning", "awaiting materials" and "ready to work". When a work package receives permission to be worked, it is placed in a working status. If the work package release has to be suspended (removing permission to work the package), a "J-8" suspension form is completed. The reason for the suspension and then the re-start date is documented. (In some CMMS' this documentation is the worker selecting a 'delay code' from a drop-down list provided in the CMMS versus a hardcopy form.) When the work is complete and job closed out, the work package receives a completed status.

Pre-formatted codes for the reason for the work suspension were developed. Typical codes include: material/tools incorrect, post-work test failure, craft resources not available, weather or access delay, support resources not available, priority change, work instruction not correct, safety requirement, plant system not available, scope change, etc. Typical codes are configured in the CMMS, and some can be modified to fit site conditions. In some cases, it is known ahead of time that only a portion of the work can be released. In this case, a "planned suspension" is performed when the point at which the work needs to be stopped is reached. "Planned suspensions" are not counted as suspensions for purposes of this indicator.

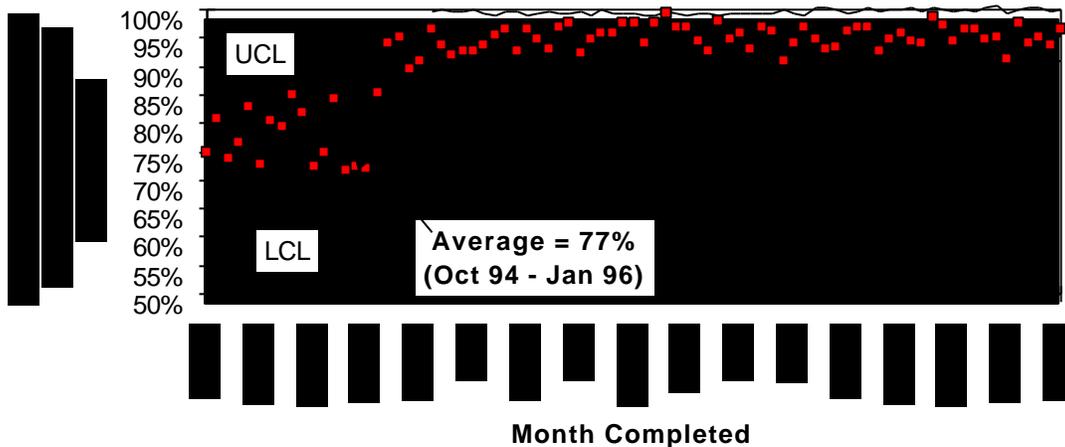
Data Retrieval: The analysis process begins with data retrieval. Work status codes and their time history are retrieved. For each work package, a computer program determines:

- if a work package was ever placed in "working" status
- if a J-8 suspension was ever recorded
- the authorized date(s) of J-8 suspensions, and the associated reason codes
- the first date that a "completion" status was reached

The data are organized and counted by the month of the completion date. Work in progress is not included until the completion date is reached. Note: This can cause an anomaly with older work packages that may have been suspended years ago, but did not reach actual completion until recently.

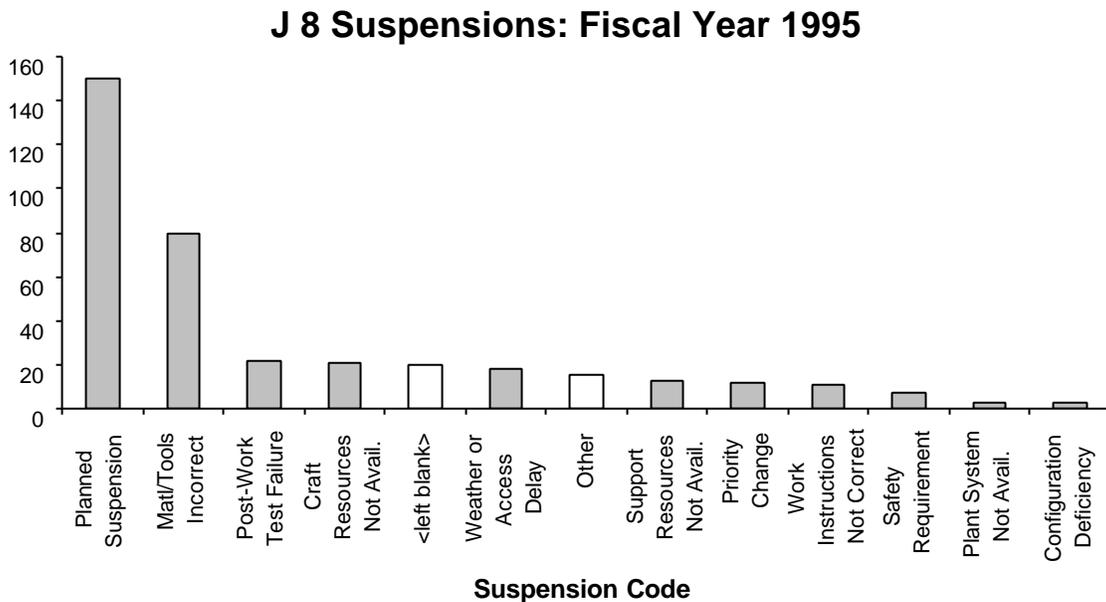
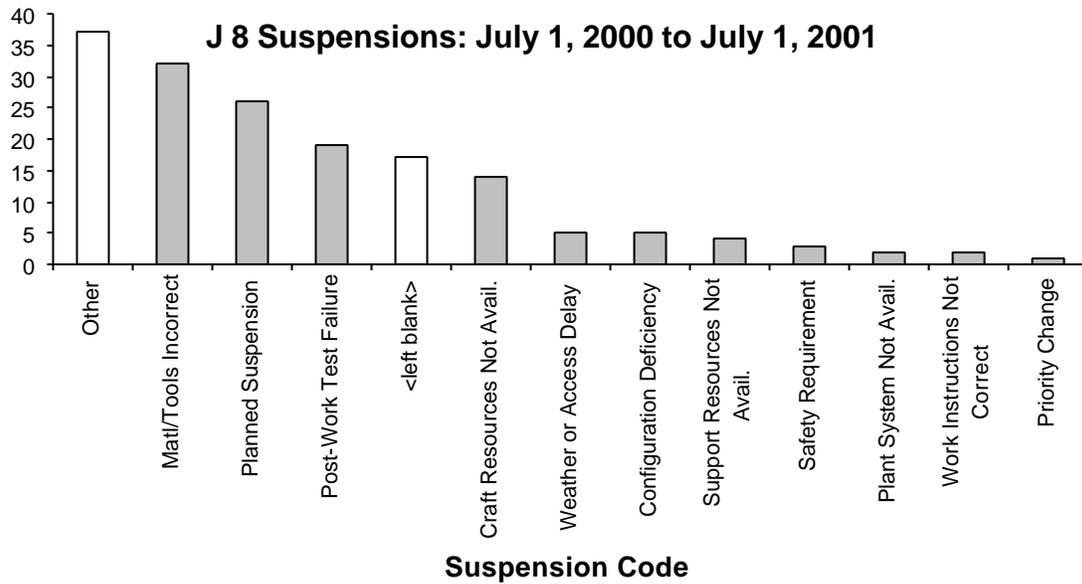
Charting and Data Analysis: The number of work packages completed without an unplanned suspension for each month is divided by the total number completed for that month. The resulting percentage is plotted on a “p-chart” control chart. See <http://www.hanford.gov/safety/vpp/pchart.htm> for an explanation of p-charts. A supporting Pareto chart (see <http://www.hanford.gov/safety/vpp/pareto.htm>) is made of the reasons for suspensions for any suspensions made during a period of a trend or anomaly identified on the p-chart. Example charts are provided.

Use of the Performance Indicator in order to Improve: In this example, in fiscal year 1995, 23% of all work packages received some form of unplanned suspension. The fiscal year 1995 Pareto chart was used to prioritize which work control process steps would be looked at for improvements. “Materials and tools not correct” was a leading reason, and still is, but the incidence rate has dropped by two thirds. After “materials and tools not correct” problem was worked on, the completion rate without suspension improved in fiscal year 1996, and reached a stable level of 95% (only 5% of work needing suspension). Note that new control limits were calculated on the p-chart.



One trend was noted. In January 2001, a significantly high amount of work that was completed that month had involved a suspension. This is seen at the circled point on the control chart, and because the point was at the control limit, further analysis was mandated. The facility had as part of its Health of Facility Milestone that was due 1-31-01 some packages that were linked by virtue of needing common plant circumstances that are difficult to set up. The packages had been previously suspended because they had gone as far as they could toward repair and required the unusual plant setup in order to complete the repairs. In fact, the facility had three different groupings of this kind of thing in January, thus the unusual dip in this parameter. No other work control process problem areas were identified at that time.

Overall, work proceeds smoother and more efficiently than in fiscal year 1994, and this performance indicator helps to analyze the work control process for problem areas, document the improvement, and assist in maintaining the improvement in place. Recently the facility has noted that "other" and "left blank" categories have gained prominence. The facility management is taking action to correct a large number of those, in addition to discussing codes with the staff again. The codes are also being reviewed to see if they are still valid to current operations, and changes in how suspensions are classified may be considered in order to gain further improvement.



Summary

- ? The “work suspension” performance indicator tool can analyze the maintenance work control process for work suspension problems.
- ? The performance indicator tool can be adapted to any (computerized) maintenance management system.
- ? The p-charts graphs performance.
- ? The Pareto chart tells where the problem areas might be.

Assistance and References

Steve Prevette
QA Engineer, ESH Radiological Compliance
Fluor Hanford, A Fluor Global Services Company
ASQ Certified Quality Engineer
steven_s_prevette@rl.gov
509-373-9371

[Guidelines for Statistical Process Control](http://www.hanford.gov/safety/vpp/spc.htm)-a discussion on the use of performance charts can be found at
<http://www.hanford.gov/safety/vpp/spc.htm>

About EWP

Enhanced Work Planning (EWP) is a community of DOE sites promoting improved safety performance through improved process performance. EWP is work control process oriented. The tenants of EWP are:

- Line management ownership
- Organizationally diverse teams
- Graded approach based on complexity and risk
- Worker involvement at the beginning
- Organized communications

To learn more about EWP, go to the EWP web site at:

<http://tis.eh.doe.gov/beta/ewp/>