CHAPTER B.9 — PRESTARTUP REVIEW

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CONTENTS

OPERATIONAL INTEGRITY MANAGEMENT — THE SERIES

This is the ninth chapter in the second volume of a series of books to do with *Operational Integrity Management*. The Table below provides a list of current books and chapters (the current chapter is highlighted). The full Table of Contents can be viewed at www.suttonbooks.net/downloads/toc.pdf.

The first volume in this book series provides an overview of operational integrity management (OIM): what it is, how it works, and what it achieves. This volume also provides an overview of the industries where OIM principles and practices are typically applied. The second volume, of which this chapter is a part, examines the sixteen management elements of a representative operational integrity management program, and shows how they fit with one another. The third volume describes the principles of risk management — principles which are used in all aspects of operational integrity work. The third volume also provides information to do with occupational and behavior-based safety. The fourth volume describes the all-important topic of regulations, along with an overview of various industrial standards. The fifth volume pulls together the materials in the first four volumes. It shows how operational integrity management systems can be designed, implemented and audited. It also discusses how OIM can be integrated into projects. The sixth and final volume provides a wide range of 'deliverables' that can be used by OIM professionals to manage their work.

INTRODUCTION

Of the sixteen elements of Operational Integrity Management (OIM) listed in Volume B of this series, it could be argued that the Prestartup Safety Review program is the least understood and the most neglected. Yet experience has shown that the correct use of prestartup reviews can help avoid serious accidents with a minimal investment in peoples' time.

A Prestartup Review (PSR) is conducted on a new or modified facility immediately prior to the handover from the project team to the operations and maintenance personnel who will be running that facility. The PSR serves as a check to make sure what *is* handed over to the operations and maintenance is what *should* have been handed over.

Regulatory agencies such as OSHA (the Occupational, Health & Safety Administration) use the term Prestartup Safety Review (PSSR) because of these agencies focus primarily on safety. However problems during start-up can also cause operability problems, so the term used in this chapter is simply 'Prestartup Review'. If the start-up is for an existing facility, say following a shutdown for maintenance, the review is sometimes called a Restart Review.

A typical PSR has three components:

1. Ensure that all action items and recommendations from Process Hazards Analyses, Management of Change reviews and other safety or operability studies are complete.

2. Ensure that no changes that could affect operational integrity have crept into the system during the fabrication, construction and installation phases of a project.

3. Ensure that interface issues caused by the facility change are fully understood and addressed.

PSRs are important because projects frequently fall behind schedule and/or run over budget, thus often creating pressure on the project team to eliminate or postpone the installation of any items that are not absolutely necessary for the start-up. If not controlled properly, this pressure can lead to corner-cutting — either intentional or inadvertent — which may in turn jeopardize the safety of the facility. By carrying out a PSR, the operations and maintenance departments — the primary customers of PSR — have the authority to refuse to accept "care, custody and control" (*see* Chapter E.2 — *Operations and Maintenance* for an explanation of this term) of a facility that they judge to be unsafe or difficult to operate. In effect, a Prestartup Review provides a breathing space in which everyone can make sure that the plant that they are about to start is safe and operable, and that what was delivered and constructed is the same as what was specified and ordered.

Generally, the following issues will be checked during a PSR review.

- New and changed equipment and instrumentation has been installed and commissioned in accordance with design specifications;
- Updated safety, operating, maintenance, and emergency procedures are in place;
- All management of change issues have been closed out;
- Follow-up actions from incident analyses have been completed;
- All outstanding findings from process hazards analyses have been addressed; and
- Training for each employee involved in operating the new or modified process has been completed.

A PSR has the form of an audit, but it is not a formal Compliance Audit such as is described in *Chapter B.16 — Audits, Assessments and Quality Assurance*. Nor does the PSR team check basic design standards or calculations. The purpose of the PSR is to make sure that all the operational integrity work that had to be done prior to startup was in fact done; it is not the purpose of the PSR to evaluate the work itself. Therefore, a PSR can be more flexible than an audit. For example, on one facility there had been times when operations personnel, acting on their own initiative, had bypassed certain interlocks without going through proper procedures. During a turnaround, the interlock system was upgraded in order to prevent such unauthorized over-rides. Part of this facility's PSR was to have a knowledgeable and determined operator try to override the new interlock (while the plant was shut down) in order to see if he could "beat the new system".

Not only should the PSR watch out for equipment and safety systems that may have been eliminated or degraded, it should also be concerned with equipment that may have been added at the last moment in order to address some last-minute design requirement. Such additions, which may have resulted from a PHA finding, may inadvertently reduce safety in unanticipated ways.

A PSR should also be conducted on equipment that been idle for an extended period, even if no intended changes to the process have been made, because the equipment may become degraded while it is lying idle For example a section of a facility may have been idled for a few months due to lack of economic demand. On restart it may be found that some equipment may have deteriorated such that a hazardous condition can occur. Pump shafts may have bent out of alignment, pockets of corrosive materials may have formed at the base of storage tanks, or instruments contacts may have become defunct.

A PSR considers not only equipment and instrumentation but also "soft" issues, such as operating procedures and training. In particular, it is very important that the operating procedures be updated to reflect the changes that have been made, and that the operators are then trained in the new procedures before they start work on the modified facility. The need to check on training is particularly important because many changes are made and reviewed quite quickly. It is only too easy to overlook the training of various individuals because they happened to be off work for some reason.

PSRs frequently identify documentation problems. During the construction and commissioning of a facility there is usually considerable pressure just to get the plant completed and up and running. Hence the record-keeping part of the project may slip. If, in the judgment of the PSR team, any missing or incomplete documents are important to safety, then the team must ensure that those documents are completed and issued before the plant is started.

Finally, a PSR is not a last-minute Process Hazards Analysis (PHA). The PSR merely checks that an adequate PHA was carried out on the changed facility, and that all the findings were implemented or closed out in a professional manner. The PSR does not actually analyze the new system for hazards. (Some companies designate the last PHA in a sequence of PHAs as being the PSR. Such a designation indicates a misunderstanding as to the role of the PSR.)

THE "HOSE INCIDENT"

Chapter A.2 - *Historical Background* included a description of an incident that led to an explosion and to two men being seriously hurt. There is little doubt that, had the facility management conducted a Prestartup Review, the incident would have not occurred.

The incident is described below.

Figure B.9.1
Intended Hose Lineup
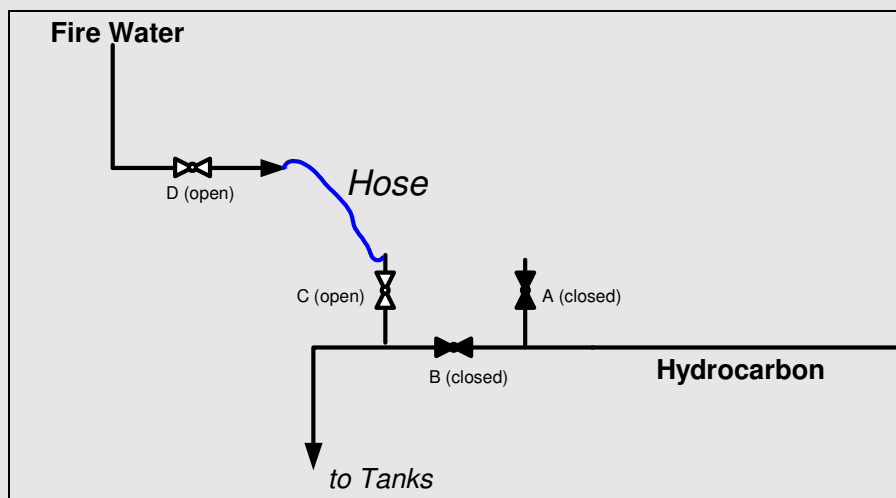
The company involved had decided to clean out some tanks prior to their demolition. The first step in this process was to water wash the tanks (which had been emptied, but still contained residual hydrocarbons). The proposed change is shown in Figure B.9.1. The tanks were isolated from the hydrocarbon header by closed block valves. A hose (about 100 feet long) connected the line to the tanks to the fire water header. The fire water and tank valves were to be opened so that water could enter the tanks.

In making the connection, the operator had, in point of fact, made a "change" in the context of Management of Change (MOC) by connecting two processes not normally associated with one another: fire water and hydrocarbons. However, neither he, nor any of his associates or managers, recognized that these two processes were not an integrated whole. Because the MOC system was not activated no other elements of operational integrity management — including a Prestartup Safety Review — were initiated.