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## **A STUDY ON PLANT SHUT DOWN PROCESS AND ITS IMPACT ON TIME AND COST**

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### **Abstract:**

The main purpose or objective of this report is to study the process involved in project management with specific reference to initiation process of plant shutdown and its impact on time and cost in the Oil Field Services. Documents involved in the whole process of initiating a plant shutdown are going to be examined and its impact on cost and time. Quantitative data have been used to get the required data and then analyzed. The result of this research will highlight the important documents required for initiation process of plant shutdown and those documents how it impacts time and cost. The research findings indicated the list of documents to be prioritized during the initiation process and the impact of those documents on cost and time.

**Key Words: Plant Shut Down Documents, Project management, Oil Field Services**

## **Introduction**

Global pressures for goods and natural resources continue to increase and organizations need to find better and innovative ways to use advanced technologies to meet its emerging challenge. Oil and gas are the most important commodities that are essential drivers that keep the world of commerce more dynamic. Generally, refineries take crude oil and refine it into gasoline, diesel and other petroleum products. In some cases, the operators of a refinery will need to bring down all or part of the operations. A shutdown is simply retreating or closing the refining process. A turnaround is a planned break in production so that maintenance may be performed. The effects of a shutdown or a turnaround can make a difference in the supply available to retail fuel outlets.

Plant Shutdown or Turnarounds refers to the whole refinery or industrial plants are taken off stream or revamped or renewal for a specific period of time for one month or more depending on the size of the plant. There are many reasons that lead to a refinery shutdown. Shutdowns can happen when a refinery does not have access to cheap natural gas, which is necessary for the refining process. Shutdowns can also happen when crude oil prices get too high. Accidents and natural disasters can shutdown a refinery as well. As a refinery shutdown is not planned, a shutdown immediately affects supply. If a shutdown happens during a high season of demand, it can cause fuel prices to increase dramatically. This price increase happens especially if other refineries are shutdown or in a turnaround.

Refineries need to have preventive maintenance, renovations, or upgrades at regular intervals. These periodical, regular processes allow the refineries to ensure safe operations, stay competitive, and meet government regulations. Often, these periodic activities require the refinery to shutdown all or part of the refining production. Planned shutdowns are known as turnarounds. Most refineries go through a turnaround every three to five years. Each turnaround requires extensive planning and careful coordination of labor and materials. Most often, the shutdown happens when production is at its lowest and required skilled labor is readily available. Some turnarounds take a few weeks to complete. Others may need a few months.

Turnarounds depend entirely on the extent of the project and any problems that occur or are found along the way. Most refineries go through an extensive inspection and testing process during a turnaround. If the inspection or testing identifies a problem, the time may be extended. The actual process involves an inspection, testing and maintenance of the plant. The initiation process of plant shutdown commences from proposal of client which is also called BOQ (Bill of Quantities). After receiving the BOQ the company submits documents with the BCS (Bidding Confirmation sheet). BCS is accepted by the client. After the acceptance of BCS, for approval submission of documents is needed. Client then raises LPO (Local Purchase Order) for work.

Time and cost are both important factors in any business. Due to global competition time equals to money. Any organization needs to keep up with the fast moving competitive world to survive in any industry. Every activity involved in any business has cost. For projects especially budgets are allocated and it's the responsibility of the project manager and the firm as well to work under a budget. In every project the activities involved either take longer period of time to complete or shorter period of time. It is a factor which is uncontrollable. Time and cost both play a very important role in any organization.

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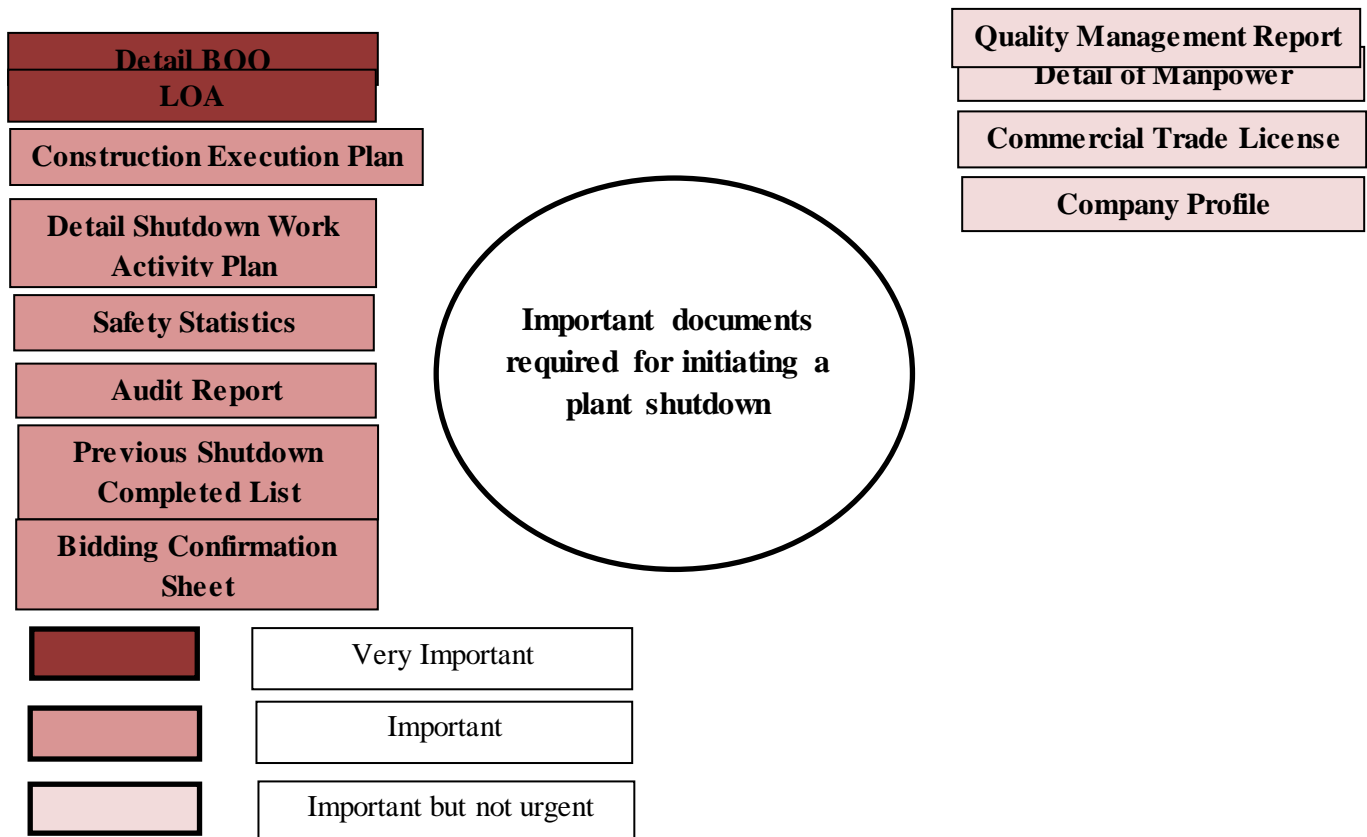
The reason behind this research at Oil Field Services is to examine the process involved in project management specifically referring to initiation process of plant shutdown and its effect on time and cost. The purpose or objective of this research study is to know the importance of documents needed in time for the initiation process of any project, in this study it's specifically referring to plant shutdown. And by any time delay in receiving of those documents could have an impact on cost or lead to losing of the job order. Delphi Technique was used to compile all relevant information from experts in the field. Employees of Business development department were interviewed to get information regarding the documents required for the shutdown. Questionnaires were distributed to Business development department, Procurement department, Estimation department and the Finance department. These questionnaires focused on the documents that would have an impact on time and cost for the initiation process of plant shutdown.

The following are some of the activities undertaken by Petromen subcontracting company that were referred for this research report:

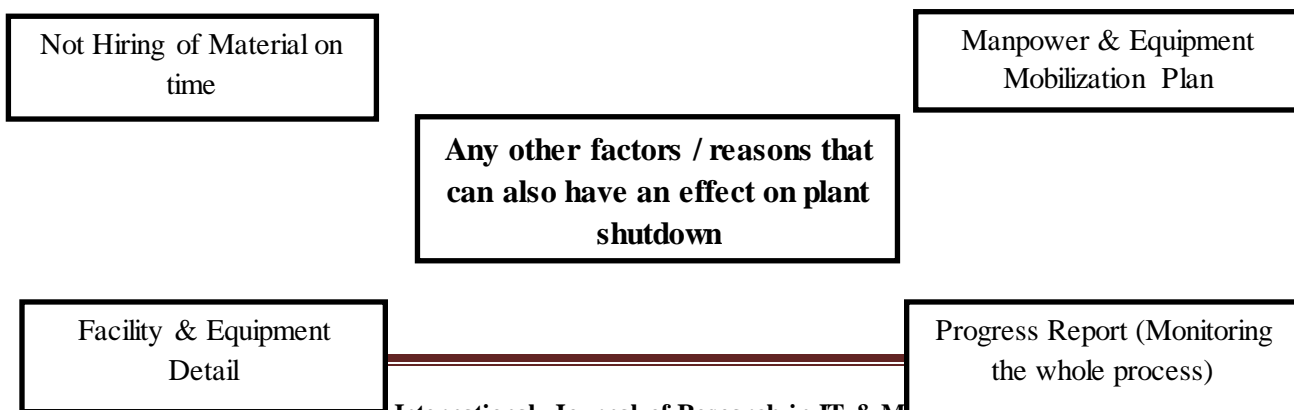
- ✓ Shutdown of UMM AL NAAR Refinery including complete overhauling of columns, Vessels, heat exchanges and chemical cleaning. Client: Descon Engineering.
- ✓ Maintenance of Ammonia Storage Tanks including Blinding de-blinding, tank cleaning, valves replacement, installation of new equipment and all associated E & I works. Client: Cape East.
- ✓ Shutdown including Plant overhauling, maintenance of mechanical equipment & other related works. Client: Doosan Babcock.
- ✓ GASCO Ruwias Train-2 Shutdown – Plant Overhauling, maintenance of Mechanical equipment, vessels, drums, Tanks, piping, valves replacement of Fin Fan coolers & axillaries. Client: Emdad Services.
- ✓ -GASCO ASAB 1 & 2 Shutdown – Plant Overhauling, maintenance of Mechanical equipment, vessels, drums, Tanks, piping and valves replacement, Fin fan coolers & axillaries. Client: Emdad Services.
- ✓ -Shutdown / Turnaround of Takreer Refinery i.e. provision of expert personal for the overhauling of vessels, columns, heat exchangers, maintenance of valves including piping & other mechanical related jobs. Client: Al Raeed Recruitment Services.
- ✓ -Part-I Alignment of pumps, compressors and other rotary equipment including termination of LV & MV cables. Client: Samsung Engineering Takreer U & O Project.
- ✓ Part-II Fabrication/Erection of CS/LTCS/SS piping up to 10,000 dia inch including RT/PWHT, Hydro test and subsequently pre-commission activities. Client: Samsung Engineering 2015-ongoing.
- ✓ -Maintenance, Modification & refurbishment work of flare including replacement of flare tip & related piping, installation of equipment, instrumentation, electrical & civil work. Client: DOME International 2015-ongoing.
- ✓ -CMEI Project-flare modification of ASAB CDS which includes fabrication / erection of structural steel, piping, equipment and civil related jobs i-e equipment and structure foundation, cable trenches, pits and associated electrical & Instrumentation job. Client: Petrofac ADCO

## RESEARCH RESULT & DATA ANALYSIS

The documents listed are the response received from employees who belong to respective departments such as Business development department, Procurement department, Estimation department and the Finance department. It is according to ranking list, very important, important and somewhat important.



### Factors / reasons that can also have an affect plant shutdown



The above responses listed were received from employees who belong to respective departments such as Business development department, Procurement department, Estimation department and the Finance department.

The project findings are based on the collected data from the questionnaires, which were filled by employees who belong to respective departments such as Business development department, Procurement department, Estimation department and the Finance department of Petromen Contracting & Oil Field Services. The purpose or objective of this research study was to know the importance of documents needed in time for the initiation process of any project, in this study it's specifically referring to plant shutdown. And at what level does that document have an impact on time and cost. The questionnaires gave a satisfactory result which met with the objective of this research study. Work sheets, tables, bar charts and pie charts were used for the analysis of the data. After the data analysis it was found that there are documents such as "Detail BOQ (Bill of Quantities)" or "LOA (Letter of Acceptance)" which are important for the initiation of a plant shutdown and at what level do they impact cost or time.

**The important documents which were highlighted for the initiation of a plant shutdown were as follows:**

The documents which were very important were Detail BOQ (Bill of Quantities) and LOA (Letter of Acceptance), from the listed above documents it is understood that these documents need to be prioritized for the initiation process of a plant shutdown. The other documents which are important is the following: Construction Execution Plan, Detail Shutdown Work Activity Plan, Safety Statistics, Audit Report, Previous Shutdown Completed List and Bidding Confirmation Sheet. In the category of somewhat important documents Quality Management Report, Detail of Manpower, Commercial Trade License and Company Profile are to be found.

Some of the documents were taken into study in the questionnaires to know its importance and its impact on cost and time whether it's high, moderate or low. The results are mentioned below.

"Detail BOQ (Bill of Quantities)" acquiring it for the enquiry of client, majority responses were that they strongly agree it is very important and it would have an impact on cost more than time at a high level. Second document which under study was "Construction Execution Plan", important document, have an impact on time more than cost at a high level. Third document "Quality Management Details", somewhat important document and it have an impact on both time and cost at a moderate level. Fourth document "Safety Statistics", important document, it have an impact on time and cost at a moderate level. Fifth document under study was "LOA (Letter of Acceptance)", very important document, impacts time and cost both at a high level. Sixth document "Detailed Shutdown Work Activity Plan", an important document, impacts time more than cost at a high level.

Lastly other factors or reasons which were mentioned by the respondents are mentioned below:

- ✓ -Not hiring of materials on time.
- ✓ -Manpower and equipment mobilization plan.
- ✓ -Facility and equipment details.
- ✓ -Progress report (Monitoring the whole process).

**Conclusion:** This report helps in highlighting and prioritizing the documents needed for the initiation of plant shutdown and furthermore it also helps in analyzing which documents have an effect on time and cost and at what level. And by any time delay in receiving of those documents could have an

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impact on cost or lead to losing of the job. Looking at the market of Oil and gas, it's getting difficult for the organizations to survive. Losing of job will lead to loss of business. This will help the departments such as Business development department, Procurement department, Estimation department and the Finance department to prioritize and acquire the documents, to save cost and time for the organization.

This research project was done in Petromen Contracting & Oil Field Services and its main focus was on the initiation process of plant shutdown and its impact on time and cost. Documents involved in the whole process of initiating a plant shutdown were examined and those documents at what level do they have an impact on cost and time. The questionnaires were distributed among the employees who belonged to respective departments such as Business development department, Procurement department, Estimation department and the Finance department.

After analyzing the data the findings, it could be seen, first of all the important documents were highlighted for initiating a plant shutdown and their impact on cost and time. The challenges faced were time limitation and getting information or response from the engineers because majority of the time they were on work site and would come to the head office for a very little time.

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