1Q 2019
Volume 4, Issue 2

OIL & GAS CONSULTING

UPSTREAM & MIDSTREAM PIPELINES AND FACILITIES

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Crisis Management Plan Overview

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It is not possible to prepare emergency plans for every contingency. For this reason, key project personnel must be prepared with plans flexible enough to make decisions based on the situation developing at the time.

For plans to work it is important that principles and employees know what is expected of them, their duties and responsibilities. Cooperation will be needed from everyone for plans and decisions to be effectively carried out.

In all cases, the first necessary step is to coordinate with the local embassies of represented expatriates. Many embassies are required to have an Embassy Action Committee or similar entity. This committee is responsible for developing government crisis management plans and recommending appropriate actions to the Ambassador in the event of a crisis or emergency. Coordination with embassies and/or consulates may alleviate many problems in a crisis situation.

Additional sources of liaison are other similar multi-national firms operating in the area. Processes should be in place to obtain the help of local government agencies to afford an orderly and legal evacuation should this become necessary.

The purpose of a Crisis Management Plan and Evacuation Procedure is to establish an approved plan for the systematic withdrawal or evacuation of project and staff personnel and their dependents in the event their safety can no longer be assured in the project area. The Plan should also contain information for bomb threats, kidnapping and terrorist activities and other individual guidelines for individual use during developing events.

Senior management of the operating company, in consultation with the senior project manager, typically make all decisions regarding evacuation. In turn, the senior manager in country should keep the appropriate headquarters office fully advised of all situations where evacuation ultimately may be required. In the event of a breakdown in communications between the local and the home office or any other unforeseen obstacle, the senior project manager must be prepared to make evacuation decisions.

Circumstances that could be reason for enactment of this plan include, but are not limited to:

- Civil/Communal Unrest/Hostilities
- Crimes against Persons, Kidnapping, Assault
- Outbreak of War or Act of War
- Sabotage or Terrorism
- Natural Disasters including Earthquake, Hurricane/Cyclone/Typhoon, Flooding
- Plague or Epidemic
- Medical Hazards, Exposure to Contagious Disease
- Injury or Illness Requiring Evacuation for Medical Treatment

This list is not all-inclusive, but is given as a guide to help assess levels of risk. Many risks are beyond our control and others have such a remote likelihood as to be discounted. Some, however, are of sufficient frequency that they can be prevented or mitigated by appropriate planning and action.

I can assist in developing Crisis Management Plans, including response to activist, media, external affairs, NGO's, community engagement, etc.

Code Comparisons for Piping Stress & Supports

This high level overview is intended to provide a general comparison among the US codes and regulations with regards to piping stress and supports. After the appropriate code is selected, that complete code should be consulted for specific requirements. To reiterate, the comparisons shown below are general, high level, and should not be utilized as a design basis – consult the applicable code.

ASME B31.3

ASME B31.3 is more stringent for the flexibility analysis of steam lines as opposed to ASME B31.1. Boiler external piping (as defined in ASME B31.1) should be analyzed in accordance with ASME B31.1. The reactions exerted on any connected equipment by the piping system should not exceed the manufacturer's recommended allowable load. Moreover, the temperatures of all supporting elements should be maintained within the appropriate temperature limits for the specified material.

ASME B31.3

Because ASME B31.3 covers high temperature piping systems. This code has more guidance on flexibility analysis than either ASME B31.4 or ASME B31.8. ASME B31.3 permits supports made from most material types, including unknown steels and wood, providing that the supporting element is properly designed with temperature, strength and durability the primary design considerations. Piping systems exert forces and moments on connected equipment, such as pumps, compressors and vessels. These piping loads exerted on equipment should not exceed the manufacturer's recommended allowable loads.

Lines regulated by the U.S. Department of Transportation (DOT) are designed in accordance with 49 CFR 192 or 49 CFR 195.

ASME B31.8 should be followed as required by Part 192; ASME B31.4 should be followed as required by Part 195.

ASME B31.4

If ASME B31.4 pipe is designed to operate at or close to its allowable stress, all connections welded to the pipe should be made to a separate cylindrical member that completely encircles the pipe. Furthermore, this encircling member should be welded to the pipe by continuous circumferential welds. As in ASME B31.1 and ASME B31.3, there are no restrictions on the types of material used for supporting elements.

ASME B31.8

ASME B31.8 does not permit the use of permanent supports made of combustible materials, such as wood. If ASME B31.8 pipe is designed to operate at a hoop stress of 50 percent or more of the specified minimum yield strength (SMYS), support of the pipe should be furnished by a member that completely encircles it. This encircling member should be welded to the pipe by continuous circumferential welds. Where necessary to provide positive attachment, for example at anchors, the attachments may be welded to the encircling member only.

49 CFR 192

Under 49 CFR 192, flexibility and support generally conform to ASME B31.8 requirements. However, the requirements as listed in 49 CFR 192 should be followed.

49 CFR 195

Under 49 CFR 195, flexibility and support follow the requirements listed in ASME B31.4.

Capital Expenditure Estimates

Overview

Capital Expenditure (CAPEX) estimates should encompass all the incremental capital expenditures associated with making an investment. Not only is it important to consider the current investment requirements, but also the known capital investments that may be required later in the useful life of the investment. SMEs, consultants, construction engineers, facility or drilling engineers, should develop the cost estimate. The analyst should support the SME's to ensure the experts are providing the information necessary to do a proper analysis. A key portion of the CAPEX estimate, in addition to labor, materials, and equipment is allowances.

Allowances

Allowances are included in an estimate to address risks in known areas or simply *known unknowns*. For example, knowing that wastage occur in pipe installation, an estimator includes an allowance of additional piping over and above the exact quantities to be piped. Experience has shown that allowances are necessary and expected to be fully spent.

Another example of a typical allowance is Contingency. Every estimate, regardless of the project's stage of development, is incomplete or inaccurate to some degree. We add contingency to more closely estimate the final cost of the work. In contrast to allowances, contingency covers largely unknown and undeveloped scope, and minor variations or fluctuations in the marketplace. The unknown or undeveloped scope is a consequence of the level of engineering and design done to date. Early in a project, little engineering may be complete and a number of items contributing to the final cost have not yet been identified. As engineering and designs mature, the amount and impact the "unidentified" items is reduced.

The difficulty is in determining the contingency in accordance with the risks posed and at a level to commensurate in achieving an equal chance of overrunning or under-running the total estimate.

Contingency should account for:

- Risks that an estimator reasonably judges may occur on a project such as design changes (design evolution), minor variations in material and equipment prices, and normal execution-related issues such as material shipping delays, rework, and other inefficiencies.

Contingency should *not* account for:

- Unanticipated and unforeseeable events that are beyond an estimator's capability to predict reasonably including situations like unusually inclement weather, civil unrest, hyperinflation, unexpectedly large currency fluctuations, and most importantly, discretionary changes to the project objectives.

For economic evaluations, it is important to identify and recognize the total cost uncertainty, regardless if the risks considered "fit" the definition of contingency or not. When it is appropriate to include risks related to weather, civil unrest, or other factors not included in contingency, the additional risks should be included as project reserves. The distinction between contingency and reserves may not be important for discussions with construction contractors, who may not be aware of provisions made for reserves, but for the economic evaluation, the total cost expectations and uncertainty is what is important.

There are several methods for determining the amount of contingency needed, each with advantages and disadvantages. These include estimator judgment, percentages based upon the level of engineering detail and Class of estimate, Monte Carlo analysis, or a parametric statistical approach.

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