Capacity Allocation and Nominations

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Capacity allocation is a way of life today as many of the lines are at full capacity or line pack due to the increased production. Many gathering lines are at capacity especially in the various shale areas where there is insufficient infrastructure such as the Williston Basin, Eagle Ford, Marcellus, Utica, etc.

Similarly in existing areas like the Marcellus, Eagle Ford, Permian basin and Williston basin the gas production has increased significantly due to well workover's, and re-fracking the wells to increase the production without any major cost compared to drilling new wells. The existing gathering lines diameter and the pressure rating are fixed which often limits the quantity of gas the gathering lines can transport. Additionally, as the gathering lines age the pressure rating may be reduced due to corrosion, erosion or a combination of the two, because the wall thickness of the pipe has been reduced over time. Consequently, producers are frequently allocated the amount of gas they can put into the gathering line.

In areas where the production is primarily oil with associated gas, producers have a decision to make. They can shut-in the well if they have reached the allocated gas volumes or they can flare the gas. Frequently, oil producers choose to flare the gas so they can continue to sell the oil. If there is an upset at the gas plant, the gathering line is temporarily out of service. Again, often the choice is made to flare the gas from either oil or gas wells so that the wells are not shut-in as the well may not come back on with as much production as before the shut-in.

Nominations

Today the gas going into or out of either gathering lines or intrastate or interstate pipelines must be nominated. With the conversion of numerous coal-fired electric generation plants being converted to natural gas fired electric plants the nomination process has become more frequent. With the new FERC 809 allowing intraday nomination cycles, the need to know exactly how much natural gas is being delivered or received compared to the nominated amount is critical. Stiff penalties can be in play if the nominated volume vs. the actual volume is off by more than five percent. Thus the need for frequent data collection and the ability to use valve control to deliver within five percent of the nominated volume becomes necessary.

System Balance

The inlets to the system vs. the outlets to the system are compared in system balance. Thus, from a production standpoint the production from each of the wells on the lease minus the gas used for gas lift if that production method is utilised, the fuel gas used to operate compressors or fire heater treaters, indirect heaters, glycol dehydrators or production stack packs as well as any flared volumes are compared to the gas sales volumes. In gas plant operations, the inlet gas measurement is compared to the gas used in the plant processing and the gas sales. Since gas plants take the rich gas inlet stream and strip the natural gas liquids like butanes, propanes, y-grade, etc. the system balance is typically done on a mass basis taking into account the removal of the liquids. The pipelines will also have a system balance so that any leaks can be detected early and repaired before any major catastrophes occur. Lost and unaccounted for, commonly referred to as LUAF is a tool almost all companies utilise to maximise profitability and minimise issues that can be resolved. By keeping a close eye on the LUAF, if this value is increasing the company will quickly determine the source before too much lost income occurs and the exposure to risk is minimised. For example if the LUAF is increasing because of a leak in the pipeline, that leak needs to be repaired prior to a catastrophic incident which has been known to occur. For example, on 9/9/2010 Pacific Gas and Electric owned 30 inch gas pipeline exploded in a San Bruno, California residential neighborhood at 6:11 PM. Eyewitnesses indicated the flames initially were over 1000 feet high. Thirty five houses were destroyed and 8 lives were lost as the flames were being fed by the natural gas in the pipeline. It took between 60 and 90 minutes to shut the gas off after the explosion which made rescue efforts that much more difficult. The following day, Pacific Gas and Electric stock dropped 8 percent and reduced the company's market capitalisation by $1.5 billion. Companies need to understand the system balance in order to operate efficiently, safely and profitably.

Pressure Information

Frequent communication with the pressures from the transmitters on the line assure that line pressures will be maintained less than the MAOP or maximum available operating pressure allowed for the type of pipe and the fittings used on the gathering line or pipeline. Typically, pressure relief valves are utilised to insure that the line is not over pressured. If the pressure relief valve actuates, the pressure is bled off until the pressure is under the set point of the valve. At that point, the valve should reset automatically. Often a rupture disk may be utilised as a secondary last resort pressure protection. If a rupture disk is utilised, the gas will be released through the rupture disk until the rupture disk is replaced. If proper pressure relief is not available, a catastrophic failure of the pipe may occur if the MAOP is exceeded, thus it is important to understand both current operating conditions and the current MAOP.

Communications

Whenever outages occur for any reason communication must occur between the operations group, customers' into or out of the pipeline and the downstream recipients of the gas. By receiving timely data this occurs much more quickly than it did in the past.

The flow computer data being collected on an hourly basis with alarms indicates quickly when maintenance is required for the flow computer or some other piece of equipment in the system. For example if the volume has dropped off, it may mean a well is down for some reason. In the gathering line if the pressure goes down, it may mean that one of the compressors has a problem, or that some expected delivery did not happen, or that there is a leak.

Typically in pipeline applications there will be an operations center that tracks the pipeline pressures at various points in the system. The operations center tracks line pressures, volume of natural gas in the line and also provides data for leak detection, all key pieces of data to keep the line operating properly. Most companies establish normal operations ranges for each location. If the data falls outside the normal operating range either low or high a notification shows up on the screen to alert the operators a problem may be developing. If the data exceeds an additional company established set point at the same location, an alarm will be activated in the control system and proper actions established to prevent potential catastrophic issues. Over pressure of a pipeline can cause a failure of the pipeline which may result in a fire or even an explosion in some circumstances, thus this issue is taken very seriously. The issue may be real or it may be a pressure transmitter is not reading properly or has failed. Due to the potential of a major incident the system must be checked and quickly to prevent any catastrophic incident.

If the pipeline is shut down, the companies both upstream and downstream of the pipeline must be notified so they can take the necessary steps to prevent issues as well.

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Jane Williams has over 40 years of experience in the oil and gas industry and has been very involved in the development of industry standards. She has a master's degree in engineering and has a tremendous amount of field experience. Jane's vast knowledge allows her to explain difficult concepts in an easy to understand manner.