

FLARE MANAGEMENT PLAN

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BACKGROUND:

NEW STANDARDS FOR FLARES

A FLARE IS A COMBUSTION DEVICE THAT USES AN UNCONTROLLED VOLUME OF AIR TO BURN GASES. IT INCLUDES THE FOUNDATION (FLARE STACK), FLARE TIP, STRUCTURAL SUPPORT, BURNER, IGNITER, FLARE CONTROLS, FLAME ARRESTORS, AND THE FLARE GAS HEADER SYSTEM. FLARES ARE ESSENTIAL TO MANY INDUSTRIAL OPERATIONS DUE TO THEIR ABILITY TO SAFELY COMBUST THE RELEASE OF UNDESIRABLE OR EXCESS COMBUSTIBLE GASES.

On September 12, 2012, the NSPS Ja standards were published in the Federal Register, including new work practice standards and applicability triggers for flares. The units that are affected by this rule include fluid catalytic cracking units (FCCU), fluid coking units (FCU), delayed coking units, fuel gas combustion devices (including process heaters), flares, and sulfur recovery plants. NSPS Ja is triggered if the owner of one of these units commences construction, modification or reconstruction after June 24, 2008, except for flares and delayed coking units. In the case of flares, NSPS Ja is triggered when construction, modification or reconstruction occurs after June 24, 2008.

Once a flare is subject to the NSPS Ja standards, a Flare Management Plan (FMP) must be developed and implemented, as required by the work practice standards of this rule. The EPA is placing great emphasis on completing an FMP by November 11, 2015.

OUR SERVICES AND APPROACH:

COMPLETING THE FMP

Sage incorporates all of the flare services we offer into one complete FMP to satisfy NSPS Ja or local rules. We provide assistance in completing an FMP for an affected facility by completing the minimization assessment of all contributions to the flare header during normal operations and planned startup and shutdown, a description of monitoring instrumentation and flare system parameters and specifications, an evaluation of the baseline flow to the flare, and an assessment of fuel gas system balancing. Other things that Sage included into an FMP are procedures to conduct a Root Cause Analysis (RCA) and implement corrective actions after triggering a flaring event.

COMPLETING THE FMP

DETAILED MINIMIZATION ASSESSMENT

A detailed minimization assessment determines whether discharges to the flare from the process units, associated equipment, and the fuel gas system can be minimized. The purpose of this assessment is to achieve a reduction in the number of flaring events a site has. Sage performs a flare gap assessment and investigates the process in order to address the issues in a minimization assessment.

The minimization assessment must discuss the following items in detail:

- Elimination of process gas discharge to the flare through process operating changes or gas recovery at the source
- Reduction of the volume of process gas to the flare through process operating changes
- Installation of a flare gas recovery system*
- Minimization of sweep and purge gas flow rates, if applicable

* If a facility is fuel rich, a flare gas recovery system and a co-generation unit or combined heat-and-power unit also needs to be considered.

For each of the items above, the minimization assessment must provide rationale in terms of the following considerations:

- Costs, including capital and annual operating
- Natural gas offset credits, if applicable
- Technical feasibility
- Secondary environmental impacts
- Safety considerations

If a reduction in flow cannot be achieved, a statement must be made justifying why the minimization could not occur.

MONITORING KEY PARAMETERS

Monitoring key parameters, such as flare performance, gas stream flow rate and composition, heating value, assist gas flow rate, pilot flare presence, and process unit performance, enables a facility to identify, respond to, and correct most flaring activities.

Monitoring provides reliable data for emissions calculations, which enable a more accurate accounting of flare emissions. Without proper monitoring, it is impossible to know whether the flare system is performing according to design specifications. Improving the reliability, completeness, and accuracy of flare data is expected to promote flare reduction activities and prioritize potential future investments. Reliable data is vital for effective, consistent, and fair enforcement of flaring regulations. It also informs operators of the potential economic losses resulting from flaring. Therefore, a rigorous flare monitoring and reporting program is integral to a facility's ability to reduce flaring to the maximum extent possible.

COMPLETING THE FMP

Flare monitoring devices do have specific limitations of accuracy, and these limitations must be well understood by the operators and regulators. For example, flares potentially operate over a very wide range of flow rates. Normal vent gas flow rates are typically a fraction of the overall maximum design capacity. Flow meter technology should be assessed to provide the most accurate data within the range of most likely flow rates. It is also important that any recommendations regarding monitoring devices of a flare system are based on prior analysis of reliable data derived from the actual monitoring of the system. This principle applies to all flare monitoring devices or equipment.

NSPS Ja identifies a monitoring scheme to demonstrate compliance with the rule and also provides an alternative monitoring scheme for certain flares equipped with water seals. Sage provides guidance when choosing monitoring instrumentation to be as cost-effective as possible and to appropriately collect data required operating a flare and remaining in compliance with the rule. Sage also helps in determining what the flare system parameters need to be to operate smoothly without any complications and to maximize combustion efficiency. There are events, such as smoking, that can occur if the purpose behind each flare system parameters is not understood to a great extent. In order to operate a flare with minimal complications, the flare system parameters need to be monitored effectively. Sage has an in-depth understanding of the flaring process.

BASELINE FLOW EVALUATION

NSPS Ja specifies in 60.103a(4) that a baseline flow evaluation must be conducted after the minimization assessment has been completed. The determination of the baseline flow does not include pilot gas or purge gas, provided that these flow rates remain relatively constant. The numeric value of the baseline flow is the sum of all flows that the minimization assessment determines cannot be further minimized.

Alternative baseline flow rates are established for different operating conditions provided that the following information is included with the development of separate baseline flow rates:

- Identification of a primary baseline that will be used as the default baseline
- Description of each operating condition for which a separate baseline is established
- Procedures to minimize discharges to the flare during each operating condition for which a separate baseline is established

Evaluating the baseline flow to the flare allows us to determine flow rates at which the majority of normal operations occur. Non-routine episodes of flaring are typically not included within the baseline assessment. Sage assists in evaluating the best-suited baseline flow based on data available. Choosing an accurate baseline flow eliminates the need for a RCA and corrective action in case the flare exceeds a flow rate of 500,000 standard cubic feet per day (scfd) above the baseline flow. Adjustments are usually made if there is an insufficient amount of data.

OUR SERVICES AND APPROACH:

SYSTEMATIC REPORTING PROCESS

FUEL GAS SYSTEM BALANCING

Fuel gas system balancing is important when trying to reduce flaring. In a case where the refinery's fuel gas exceeds its energy needs, additional flaring occurs. NSPS Ja specifies that the FMP must address procedures that account for reducing flaring during fuel gas imbalances. Combusting excess fuel gas is seen as a waste of an energy source that a heater or boiler can use. In most cases, excess fuel gas is not a problem. In an event where excess fuel gas is generated, process conditions can be adjusted to use most of it. Sage identifies various scenarios regarding the fuel gas system that could result in flaring at each flare. Sage also determines how to adjust process units in order to have a balanced fuel gas system.

SUMMARY:

SAGE'S FMP ASSISTANCE

The overall goals are to identify opportunities to maximize gas recovery, minimize flaring, and optimize flare performance. This results in large savings if the flare system is properly assessed. Sage has developed FMP's for refineries of various sizes and has the technical staff equipped with the knowledge to effectively address all issues you may have with NSPS Ja. Sage can prepare any NSPS Ja related documents and address any issues that may arise.