Developing Site Specific Monitoring Plans for Petrochemical Facilities – Subparts P60 J & Ja and P63 A,CC & UUU

Jon Konings – Senior Reporting Engineer

1

What is the purpose of this presentation?

- To refresh your awareness of the need for petrochemical facilities to develop:
  - Site-Specific Monitoring Plans (SSMP), or
  - Continuous Parameter Monitoring Plans (CPMP), or
  - Flare Management Plans (FMP),
  - This is needed because of the recent RSR – Refinery Sector Regulation initiative.
- Four regulations are being discussed. Two from Part 60:
  - Subpart J – Standards of Performance for Petrochemical Refineries §§60.100-60.109,
  - Subpart Ja – Standards of Performance for Petrochemical Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007 §§60.100a-60.109a
- And two subparts from Part 63.

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2

2

What is the purpose? Awareness !!

- Two from Part 63:
  - Subpart CC – NESHAP for Petrochemical Refineries §§63.640-63.671
  - Subpart UUU – NESHAP for Petrochemical Refineries: Catalytic Cracking Units (CCU), Catalytic Reforming Unit (CRU), and Sulfur Recovery Units (SRU) §§63.1560-1579 & Tables 1 thru 44
- But in its totality, all these plans should address all the compliance activities required under the RSR rule.
- Not just monitoring, but other activities, like periodic testing, visual observations, record keeping, etc...

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3

3

Awareness !!

- Like we just said, these subparts focus a lot on flares, which trigger the evolution of "Flare Monitoring Systems" or otherwise called the "Flare Management Plans", as part of the larger SSMP or CPMS Monitoring Plans.
- But let me remind you:
  "On or before January 30, 2019, the owner or operator of a flare used as a control device for an emission point subject to this subpart shall meet the applicable requirements for flares as specified in paragraphs (a) through (q) of this section and the applicable requirements in §63.671".

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4

4

General Comments and recommendations for these new plans...

- Explain in general terms the purpose of the facility. Include a brief description of the organization. One paragraph.
- Who is involved in maintaining and operating system monitoring systems, who oversees these systems and the data processing associated with them.
- Who is the responsible official for this facility. Use a title not a name.
- Explain or define unique, special terms or situations.

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5

5

General Comments and recommendations for these new plans...

- Regulations now days require that you not only show compliance with environmental requirements on a periodic basis (performance testing) and in some cases, continuously through CEMS, but by following established operating procedures and work practices.
- In your procedures, provide enough details so an auditor can understand that you know what you are doing and that you are operating your equipment properly.
- BUT, we suggest you do not include excessive details which might end up painting you into a corner or restricting flexibility to address unplanned or out of the ordinary situations.

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6

6

Additional Comments for these plans...

- Include a list of the regulations that your facility is operating under.
- Including a list of sample calculations is a good idea too.
- We suggest that you do not include a copy of the actual regulations because they can be lengthy (>100's of pages).
- Once written, be sure you and the involved participants from your plant understand it, understand their roles, and know what to do and when.

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7

7

The requirements for these plans are so much more than people initially anticipate.

- In our presentation today, we are going to identify topics which require further investigation on your part.
- Why are we just skimming the surface and not discussing details?
- Because there are lots of details to investigate. These include:
  - Many different kinds of:
    - installed equipment;
    - including installed control equipment both used and operated;
    - and there are many different kinds of monitoring equipment and systems.

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8

8

The first regulation – Subpart J – Standards of Performance for Petrochemical Refineries - §§60.100-60.109

- Compared to other regulations or subparts, J seems pretty simple and straight forward.
- That's probably because it was one of the earliest sets of regulations for refineries.
- Over the years, as control and measurement technologies improved, new regulations such as Ja were developed and rolled out.

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9

9

Subpart J – Standards of Performance for Petrochemical Refineries- §§60.100-60.109

- Even though this subpart never actually mentions a site-specific monitoring plan, there are <u>many references</u>:
  - §60.13 (Monitoring Requirements) from Subpart A (General Provisions),
  - Using Performance Specifications for CEMS in Appendix B to Part 60, and
  - Follow QA Procedures from Appendix F to Part 60:
    - 1 (CEMS),
    - 2 (PM CEMS),
    - 3 (COMS),
    - 5 (Hg CEMS and Sorbent Traps) &
    - 6 (Gaseous HCl)
  - This subpart focuses on three main pollutants and emission standards:
    - Particulate Matter (PM CEMS or Opacity)
    - CO
    - SO

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10

10

Subpart J – Standards of Performance for Petrochemical Refineries- §§60.100-60.109

- §60.105 Monitoring of Emissions and Operations
- (a) Continuous monitoring systems shall be installed, calibrated, maintained, and operated by the owner or operator subject to the provisions of this subpart as follows:
  - (1) Opacity §60.102(a)(2)
  - (2) CO §60.103(a)
  - (3) SO_2 §60.104(a)(1)
- §60.107 Reporting and Recordkeeping Requirements:
  - §60.107 (b)(1)(iii) required, "The written procedures for the quality control program required by appendix F, Procedure 1".
  - §60.107(c)(4)(vi) "Results of daily drift tests and quarterly accuracy assessments as required under appendix F, Procedure 1".

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11

11

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- Ja is a second set of performance standards for those refineries which were built, rebuilt, or modified after May 14, 2007.
- It is not uncommon when newer facilities are built, rebuilt, or modified, that new performance standards are imposed.
- Instead of developing Site-Specific Monitoring Plans (SSMP) Ja is calling out for development of "Continuous Parameter Monitor Systems Plans".

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12

12

Subpart Ja – §60.102a Emission Limitations

- In paragraphs (b) through (i), emission limits are identified for various equipment covered by this subpart, and frequently identifies continuous emission monitoring systems (CEMS) as follows:
  - Particulate Matter (PM), or
  - Opacity (COMS)
  - NOx
  - SO_2
  - CO
- In 60.105a, the installation and certification of these systems was completed through the use of Performance Specifications found in Appendix B of Part 60. Their continued performance was tied to the QA Procedures from Appendix F of Part 60 as well.

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13

13

Subpart Ja – §60.103a Design, Equipment, Work Practices or Operating Standards

- (a) Except as provided in paragraph (g) of this section, each owner or operator that operates a flare that is subject to this subpart shall develop and implement a written flare management plan no later than the date specified in paragraph (b) of this section. The flare management plan must include the information described in paragraphs (a)(1) through (7) of this section. Such as…
  - (1) A listing of all refinery process units, ancillary equipment, and fuel gas systems connected to the flare for each affected flare.
  - (2) An assessment of whether discharges…fuel gas systems can be minimized. (a)(2)(i) through (iv).

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14

14

Subpart Ja – §60.103a Design, Equipment, Work Practices or Operating Standards (continued)

(3) A description of the flare, including information in paragraphs (a)(3)(i)(A) through (G).

(4) An evaluation of the baseline flow to the flare. See (i) thru (iii).

(5) Procedures to minimize or eliminate discharges to the flare during the planned startup and shutdown of – as of the date of the submission of the flare management plan.

(6) Procedures to reduce flaring in cases of fuel gas imbalance.

(7) For flares equipped with flare gas recovery systems, procedures to minimize submission of the flare management plan.

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15

15

Subpart Ja – §60.103a Flare Management Plans (FMP)

Let's not kid ourselves. Those of you who are involved in either the development, implementing, or operating an FMP know that they are a big deal. Such as:

- Performing an evaluation of the baseline flow to the flare. Looking at paragraph (4)(i) thru (iii); it looks somewhat complicated and involved.
- Developing and writing the procedures required under paragraphs (5) and (6) are no easy tasks.
- Take these plans seriously. I am sure an auditor will.

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16

16

Subpart Ja – §60.105a - Monitoring of Emissions and Operations for Fluid Catalytic Cracking Units (FCCU) and Fluid Coking Units (FCU)

In these paragraphs, Continuous Parameter Monitoring Systems (CPMS) are called out for a number of different control devices, such as:

- Electrostatic Precipitators,
- Wet scrubbers,
- Baghouses and leak detection systems,
- With no post-combustion control devices, then the outlet temperature,
- Excess O_2 in the exhaust gas stream, and
- Follow maintenance practices recommended by the Original Equipment Manufacturer (OEM).

The operating conditions of these systems are continuously monitored and if operated within normal and acceptable operating practices, then it is indirectly assumed that their specific pollutants are also reduced and controlled to an acceptable level.

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17

17

Subpart Ja – §60.105a(b) - Continuous Parameter Monitor Systems

- Written procedures are also called out for these CPMS.
- Think of them as being very similar to work practice standards.
- When the operating conditions fall outside the range defined in these plans, the owner/operator is required to follow up and determine the root cause and correct it as soon as reasonably possible.
- Think of CEM systems as tracking your facilities' emissions while the CPM systems are tracking your control devices and the way you operate your emission sources, while minimizing emissions.

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18

18

Subpart Ja – §60.105a(b) - Continuous Parameter Monitor Systems

- Frequently while performance testing is being conducted, the operating parameters or characteristics are being recorded.
- These operating conditions and their associated operating parameters now become the new operating standard, and action is required when the actual conditions and parameters fall below the standard.
- For example, operating your system outside the established operating range can lead to an "excess emission event", as described in §60.105a(i)(1) through (6).

19

19

Subpart Ja – Continuous Parameter Monitor Systems Monitoring Plans

- I recommend that each of these systems include a write-up or description of how they operate.
- Include which operating parameter is being tracked; how it was picked; and how the operating level or range of acceptable performance shown by the operating parameters was determined.
- Describe any sort of alarming which might be present and would be activated if abnormal conditions developed.
- Describe how a typical response might occur to an alarm or abnormal situation.

20

20

Subpart Ja – CPM Systems. §60.108a Recordkeeping and Reporting Requirements

- As mentioned earlier, keep these write-ups fairly simple and general.
- These write-ups might run 1-10 pages each. Hopefully not longer.
- Due to the complex nature of a refinery or a petrochemical facility, these write-ups can be numerous.
- Remember the "KISS" principle.
- Don't try to cover every imaginable situation.
- We suggest you try to cover three operating scenarios: startup, shutdown, and normal operating conditions. Include other scenarios, but only if they occur frequently.

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21

21

The third Subpart – CC – NESHAP for Petrochemical Refineries - §§630.640-63.671

- We're going to focus on two new sections dealing with Flares:
  - §63.670 Requirements for flare control devices
  - §63.671 Requirements for flare monitoring systems
- These regulations now focus on destruction efficiency of flares (destroying Hazardous Air Pollutants) and compliance with enhanced operational standards.

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22

22

Flares – What's up with Flares?

- Flares are being focused on to ensure proper operation of the flare so it can be optimized in their intended purpose to destroy hazardous air pollutants (HAPs).
- Flare means a combustion device lacking an enclosed combustion chamber that uses an uncontrolled volume of ambient air to burn gases. For the purposes of this rule, the definition of flare includes, but it is not necessarily limited to, air-assisted flares, steam-assisted flares and non-assisted flares.

23

Flares – What's up with Flares?

- §63.670(b) ***Pilot flame presence***. The owner or operator shall operate each flare with a pilot flame present at all times when regulated material is routed to the flare. Each 15-minute block during which there is at least one minute where no pilot flame is present when regulated material is routed to the flare is a deviation of the standard. Deviations in different 15-minute blocks from the same event are considered separate deviations. The owner or operator shall monitor for the presence of a pilot flame as specified in paragraph (g) of this section.
- (g) ***Pilot flame monitoring***. The owner or operator shall continuously monitor the presence of the pilot flame(s) using a device (including, but not limited to, a thermocouple, ultraviolet beam sensor, or infrared sensor) capable of detecting that the pilot flame(s) is present.

24

§63.670 Requirements for Flare Control Devices

- On or before January 30, 2019, the owner or operator of a flare used as a control device for an emission point subject to this subpart shall meet the applicable requirements for flares as specified in paragraphs (a) through (q) of this section and the applicable requirements in §63.671.
- These 17 paragraphs (a through q) list the potential requirements for operating and managing the operation of a flare, whatever kind of flare it is.
- Several examples of requirements are: Pilot flame presence; Visible emissions; Pilot flame monitoring; Visible emission monitoring; Emergency flaring provisions and Flare vent gas; steam assist and air assist flow rate monitoring.

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25

25

§63.670 Leading to Flare Management Plans

- Furthermore, this means on or before January 30, 2019, the owner or operator of a flare needs to have a plan set up to oversee the operation of that flare.
- This leads to the development of Flare Management Plans.
- Which is no small feat....

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26

26

§63.671 Requirements for Flare Monitoring Systems

- (a) Operation of CPMS: For each CPMS installed to comply with applicable provisions in §63.670, the owner or operator shall install, operate, calibrate, and maintain the CPMS as specified in paragraphs (a)(1) through (8) of this section.
  - (1) Except for CPMS installed for pilot flame monitoring, all monitoring equipment must meet the applicable minimum accuracy, calibration and quality control requirements specified in Table 13 of this subpart.
  - The quality assurance procedures for the 7 devices found in Table 13 need to be included in the operating plans for each CPMS.
  - See the next slide for a list of these devices.

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27

27

Table 13 –Calibration & Quality Control Requirements for Continuous Parameter Monitoring Systems

- Temperature systems
- Pressure systems
- Determining Net Heating Value by Calorimeters
- Determining Net Heating Value by Gas Chromatographs – there are additional requirements for gas chromatographs
- Flow Rate Systems for All Flows Systems Other Than Flare Vent Gas Systems
- Flare Vent Gas Flow Rate Systems
- Hydrogen analyzers

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28

28

The Final Subpart – UUU – NESHAP for Petrochemical Refineries: Catalytic Cracking Units (CCU), Catalytic Reforming Units (CRU), and Sulfur Recovery Units (SRUs) - §§63.1560- 1679 & Tables 1 thru 44

- §63.1574 (f) lays out the requirements for Monitoring Plans in paragraphs (f)(2)(i) through (xii). For example:
- (i) Process and control device parameters to be monitored for each affected source, along with established operating limits.
- (ii thru vii) Six sets of operating and monitoring procedures.
- (viii) a Monitoring Schedule.
- (ix) A QAQC plan for each COMS or CEM system.
- (x) A Maintenance Schedule for each monitoring system and control device.

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29

29

Subpart UUU – §63.1572 What are my monitoring, operating, and maintenance requirements? And Tables 40 & 41

- §63.1572 (a)(1) Install, operate, and maintain CEMS according to Table 40.
- §63.1572 (b)(1) Install, operate, and maintain COMS according to Table 40.
  - Table 40 - Requirements for Installation, Operation, and Maintenance of Continuous Opacity Monitoring Systems and Continuous Emission Monitoring Systems (following §63.1572(a)(1) and (b)(1))
  - Nine different sets of CEM systems are described.
- §63.1572 (c)(1) Install, operate, and maintain CPMS according to Table 41.
- Table 41 – Requirements for Installation, Operation, and Maintenance of Continuous Parameter Monitoring Systems (following §63.1572(c)(1)
  - Ten monitoring systems are described.

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30

30

The wide variety of equipment and pollutants leads to potentially complex monitoring plans

Equipment Type	Emission Type and Limits	Operating Limits	List of CEMS Required
Catalytic Cracking Units	Table 1 – Metal HAPS	Table 2	Table 3
Catalytic Cracking Units	Table 8 – Organic HAPS	Table 9	Table 10
Catalytic Reforming Units	Table 15 – Organic HAPS	Table 16	Table 17
Catalytic Reforming Units	Table 22 – Inorganic HAPS	Table 30	Table 24
Sulfur Recovery Units	Table 29 – HAPS	Table 30	Table 31
Bypass Lines	Table 36 – HAPS and Work Practice Standards		

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31

31

Before we wrap up, let's review what these plans should include from the General Provisions of P63

- The development of a startup, shutdown, and malfunction plan is required, and that the equipment be operated according to this same plan. §§63.6 (e)(1), 63.6 (e)(3) and 63.8 (c)(1).
- At all times, the owner or operator must operate and maintain any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions.
- Note: It covers more than just the monitoring systems.

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32

32

Requirements for a Continuous Monitoring Systems

- Operating and maintenance of continuous monitoring systems. The owner & operator shall maintain and operate each CMS in a manner consistent with good air pollution control practices. §63.8 (c)(1).
- At all times, the owner or operator must operate and maintain any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions.
- Note: Again, it covers more than just the monitoring systems.

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33

33

Operation and Maintenance of Continuous Monitoring Systems §63.8 (c)

- The systems need to be installed in a manner that ensures representative sampling of the emissions.
- They shall be in continuous operation except for system breakdowns, out-of-control periods, repairs, maintenance periods, calibration checks, and zero (low-level) and high-level calibration drift adjustments.
- SSMP should list the required quality assurance activities; pass/fail criteria; description of when Out-of-Control (OOC) periods begin and end; what does it mean for the data; and how data is processed and packaged.

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34

34

More about Continuous Monitoring Systems §63.8 (c)

- If emission standards are based on extended averages (extended meaning longer than 1-hour), the plan needs to address:
  - Are there any operating conditions which allow the exclusion of emission data recorded during these periods (startup, shutdown, or maintenance periods for example).
  - These exclusion periods need to be defined as when they begin and end.
  - How the data system identifies and flags these operating periods.
  - A clear explanation of how these extended averages are calculated.
  - An explanation of how these extended averages are validated (i.e. how many valid hours are needed to make a valid extended average).

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35

35

Still More about Continuous Monitoring Systems §63.8 (c)

- The plan needs to address:
  - What is required if the emission standard or limit is exceeded?
  - How are these events handled?
  - When are copies of performance or evaluation tests (data and results) to be submitted and under what format?
  - Is there a deadline for submitting them (usually 60 days)?
  - What reports are needed?
  - To whom are these report submitted to?
  - Are these reported submitted under the signature of an officer of the operators or owners?

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36

36

The MP shall include a Quality Control Program for Continuous Monitoring Systems §63.8 (d)

- The procedures of this program are intended to help validate the monitoring data.
- A written protocol is developed for each procedure:
  - Initial and any subsequent calibration of the CMS.
  - Determination of the calibration drift and how adjustments are made.
  - Preventive maintenance of the CMS, including spare parts inventory.
  - Data recording, calculations, and reporting.
  - Auditing procedures to ensure accuracy of the data, including sampling and analysis methods.
  - Program of corrective action for a malfunctioning CMS.

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37

37

The MP shall include a Performance Evaluation Test Plan for CMS §63.8 (e)

- This evaluation shall be conducted according to the applicable specifications and procedures described in this section or in the relevant standard.
- If requested, a site-specific performance evaluation test plan needs to be prepared and submitted to the Administration.
- The data and results for these evaluations shall be submitted to the Administrator within the time period required.
- These evaluation tests would be similar to a linearity or RATA, where the CMS' performance against a standard is evaluated.

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38

38

The MP shall include Procedures for Reducing Monitoring Data for CMS §63.8 (g)(1) thru (5)

- §63.8 (g)(2) describes the reduction process for COMS and CEMS:
  - COMS: 6-minute averages calculated from 36 or more data points equally spaced over each 6-minute period.
  - Non-COMS: CEM data is reduced to 1-hour averages computed from four or more data points spaced over each 1-hour period, except:
    - During periods when calibrations, quality assurance or maintenance activities are occurring, then a valid hourly average shall consist of at least two data points with each representing a 15-minute period.

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39

39

Continued Procedures for Reducing Monitoring Data for CMS §63.8 (g)(1) thru (5)

- §63.8 (g)(3) The data may be recorded in reduced or nonreduced forms (e.g., ppm for pollutants and percent O2 or ng/J of pollutant).
- §63.8 (g)(4) All emission data shall be converted into units of relevant standard or emission limit, using the conversion procedures specified in that standard (e.g. lb./TBtu for example).
- §63.8 (g)(5) Monitoring data recorded during periods of breakdown, out of control, repairs, maintenance periods, calibration checks, etc. must not be included in any data averages, except for §63.10(b)(2)(vii)(A) or (B).

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40

40

We recommend the MP shall include and spell out relevant terms or definitions §63.2

- These terms are probably site specific, but some sample terms might be:
  - Continuous Emission Monitoring Systems (CEMS)
  - Continuous Monitoring Systems (CMS)
  - Continuous Opacity Monitoring System (COMS)
  - Continuous Parameter Monitoring Systems (CPMS)
  - Plus whatever terms which might need clarifying

41

41

We recommend the MP should include…

- It should reflect how the work force is organized; who is responsible for operating and maintaining these systems; and how the data generated is validated, reviewed, processed, used, packaged and reported.
- This description needs to be general in nature, using job titles and not the names of individuals.
- Keeping it general in nature allows for flexibility in addressing new topics as they come up.
- These MP have a much broader focus than QAQC plans.

42

42

The requirement to develop a SSMP is considered to be met for a CMS or sorbent trap system if:

Installed, certified, maintained, and operated according to Part 75	Installed, certified, maintained, and operated according to Appendix A or B to Subpart UUUUU
The recordkeeping and reporting requirements of Part 75 or Appendix A or B to Subpart UUUUU are met	The facility operates and maintains the CMS according to the Site Specific Monitoring Plan

43

43

But in closing we know Site Specific Monitoring Plans (SSMP) are…

- These Monitoring Plans are far more complicated than most people thought.
- They extend beyond the monitoring systems. They involve:
  - Periodic emission testing
  - Performance evaluation testing
  - Work practice standards
  - Maintenance requirements
  - Plus lots more
- Because the compliance plans or strategies can vary greatly and can be very site specific, there is the need for a lot more research and digging in order to develop a well thought out plan.

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44

44

Final word:
These SSMP are nothing to be taken lightly.

Since the January 30, 2019 landmark date has already passed, where does your plant stand? Make sure you know and understand your role under this plan.

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45

45

We are sure there are topics we've overlooked.
Are there any questions?

You can always contact me at Jkonings@envirosys.com or at 512/250-7915.

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46

46